"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

PAVLOV, N.N., kand. tekhn. nauk, dotsent; ARBUZOV, G.A., prof., doktor tekhn. nauk

Effect of chromium and aluminum salts on the properties of mixed polyamides. Nauch. trudy MTILP no.28:51-60 '63.
(MIRA 17:11)

1. Kafedra neorganicheskoy i analiticheskoy khimii Moskovskogo tekhnologicheskogo instituta legkoy promyshlennosti.

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PAVLOV, N.N.; ARBUZOV, G.A.; PAVLOV, S.A.; YAO DE-IN [Yao Te-ying]

Action of chromium and aluminum salts on mixed polyamides.
Vysokom. soed. 5 no.10:1558-1561 O '63. (MIRA 17:1)

1. Moskovskiy tekhnologicheskiy institut legkoy promyshlennosti.

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S/0138/64/000/005/0025/0028

ACCESSION NR: AP4038908

AUTHORS: Kuznetsov, A. R.; Pavlov, N. N.; Arbuzov, G. A.

TITLE: The modifying effect of barium and chromium salts on the properties of carboxyl containing latex films

SOURCE: Kauchuk i rezina, 23- no. 5, 1964, 25-28

TOPIC TAGS: latex film, carboxyl, barium, chromium, barium chromium fixation, tanned latex film, physicomechanical film property, latex SKS 30 1

ABSTRACT: Investigation of latex SKS-30-1 containing 20% solids and 4.23% free methacrylic acid was conducted. Films of this material were prepared in special molds lined with heavy kersey tissue impregnated with aqueous solutions of $BaCl_2$ or $CrCl_3$ and with a mixture of these salts in various proportions. The tissue was subsequently dried by a fan and an infrared lamp. Latex was poured into the molds to form layers of the desired thickness and was allowed to react for 90 seconds with the salts from the tissue lining. Next, the films were placed for one day on filter paper and heated for 50 minutes at 140C. The water treatment of the

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ACCESSION NR: AP4038908

ASSOCIATION: Moskovskiy tekhnologicheskiy institut legkoy promy*shlennosti (Moscow Technological Institute of Light Industry)

SUBMITTED: 00	DATE ACQ: 05Jun64	ENCL: 00
SUB CODE: GC	NO REF SOV: 005	OTHER: 000

Card 3/3

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

PAVLOV, N.N., inzh.; ARBUZOV, G.A., doktor tekhn.nauk, prof.

Modification of polyamide with chromium compounds. Report No.5: Study of the quantitative relations manifested in the course of irreversible bonding of chromium compounds with polyamide. Izv. vys. ucheb.zav.; tekh.leg.prom. no.6:55-63 '60. (MIRA 14:1)

1. Moskovskiy tekhnologicheskiy institut legkoy promyshlennosti. Rekomendovana kafedroy tekhnologii iskusstvennoy kozhi.
(Chromium compounds) (Polyamides)

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PAVLOV, N.N., inzh.; ARBUZOV, G.G., doktor tekhn.nauk, prof.

Polyamide modification with chromium compounds. Report No.3: Mechanical properties of polyamide in the presence of succinic complexes of chromium. Izv.vys.ucheb.zav.; tekh.leg.prom. no.3: 31-39 '60. (MIRA 13:8)

1. Moskovskiy tekhnologicheskiy institut legkoy promyshlennosti. Rekomendovana kafedroy tekhnologii iskusstvennoy kozhi.
(Polyamides) (Chromium compounds)

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hemical Abst.
ol. 48 No. 6
Mar. 25, 1954
Organic Chemistry

Some derivatives of benzothiazole IV Synthesis of derivatives [illegible] 5,6- and 6,7-benzothiazoledicarboxylic acids. [illegible] and G. I. Arbuzov (All-Union Cine-Photo Inst., [illegible]). Zhur. Obshchei Khim. 23, 489-93(1953) [illegible] 48 [illegible] Di-Me [illegible] [illegible] 9?% AcOH treated [illegible] [illegible] NH$_4$OH gave [illegible] [illegible] 5,6-benzothiazoledicarboxylate (I), m. 233-4° (from EtOH) and an unstated yield of the 6,7-isomer (II), m. 180-1°, which is more sol. in EtOH. I (2.66 g.) refluxed with 3.4 g. KOH in 170 ml. H_2O 2.5 hrs. gave 90% free acid, m. above 300°. Similarly was obtained the 6,7-dicarboxylic acid isomer, m. above 300°. II (1.33 g.) heated with 2.8 g. KOH and 2.5 ml. H_2O from 100° finally to 165° in an open flask 40 min. (until NH_3 evolution stopped), cooled, treated with 0.47 g. $ClCH_2CO_2H$ and 0.28 g. KOH in 3 ml. H_2O, heated 30 min. at 75°, cooled, mixed with 6.5 ml. AcOH, and diluted with 50 ml. EtOH gave 1.1 g. hygroscopic [illegible] K salt of 2-amino-5,6-dicarboxyphenylthioacetic acid [illegible] this acid on acidification with HCl deposits the corresponding lactam, fuses above 300° (from hot H_2O). The above K salt (1.1 g.) and 3.2 ml. Ac_2O refluxed 45 min. [illegible] fused NaOAc, cooled, treated with 12 ml. 20% NaOH, boiled 20 min., cooled, filtered, treated with 5.26 g. $K_3Fe(CN)_6$, shaken several min., then acidified with HCl gave brown 4,4'-dicarboxy-[illegible]-diaminoindigo, m. 210-12° (from EtOH). Similarly I gave the acid K salt of 2-amino-4,5-dicarboxyphenylthioacetic acid, which, treated with Ac_2O-NaOAc as above, gave no CO_2 and yielded only the lactam, fusing above 300° (from hot H_2O). No dye formation was observed.

G. M. Kosolapoff

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ARBUZOV, G.N.; LEBEDEV, S.G., red.; GAL'CHEVSKAYA, F.A., red.

[Mechanization in sericulture] Mekhanizatsiia v shelkovodstve. Tashkent, Gosizdat UzSSR, 1964. 61 p.
(MIRA 17:11)

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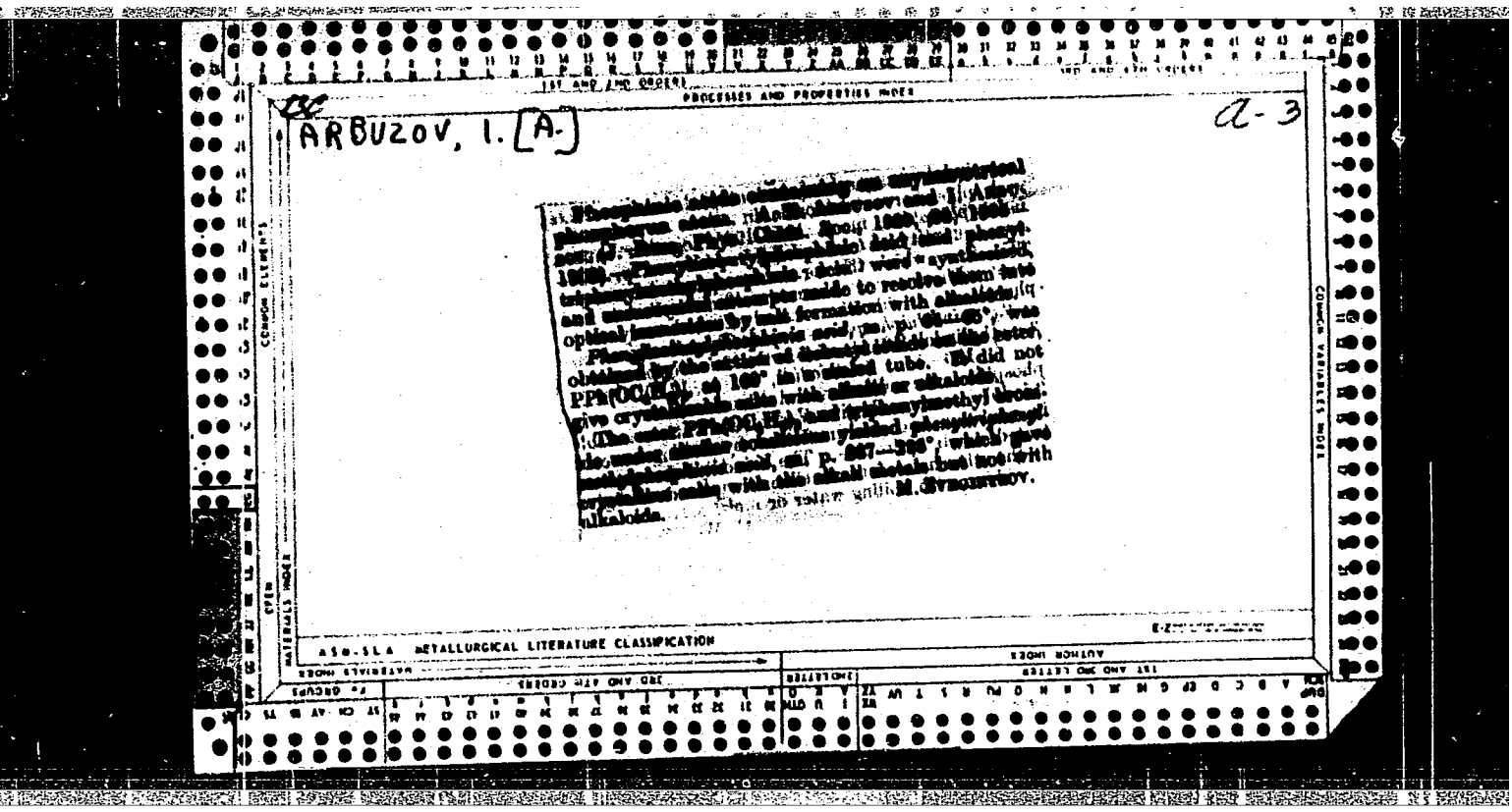

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1ST AND 2ND ORDERS | 3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

ARBUZOV, I. [A.]

n-Butyl phosphite. A. Arbusov and J. Arbusov (J. Russ. Phys. Chem. Soc., 1930, 62, 1533—1536).—Sodium n-butoxide reacts with the calculated quantity of phosphorus trichloride to give a 68·6% yield of tri-n-butyl orthophosphite, b. p. 119·5—120°/8 mm., d_0 0·[illegible]. With bromine the ester yielded the metaphosphite and butyl bromide. When heated in a sealed tube at 150—160° with n-butyl iodide, n-butyl di-n-butylphosphinate, b. p. 150—151°/10 mm., d_0 0·[illegible] was obtained, which on hydrolysis with concentrated hydrochloric acid gave n-butylphosphinic acid, m. p. 101—103° (barium salt).

M. Zvegintzov.

COMMON ELEMENTS

MATERIALS INDEX

COMMON VARIABLES INDEX

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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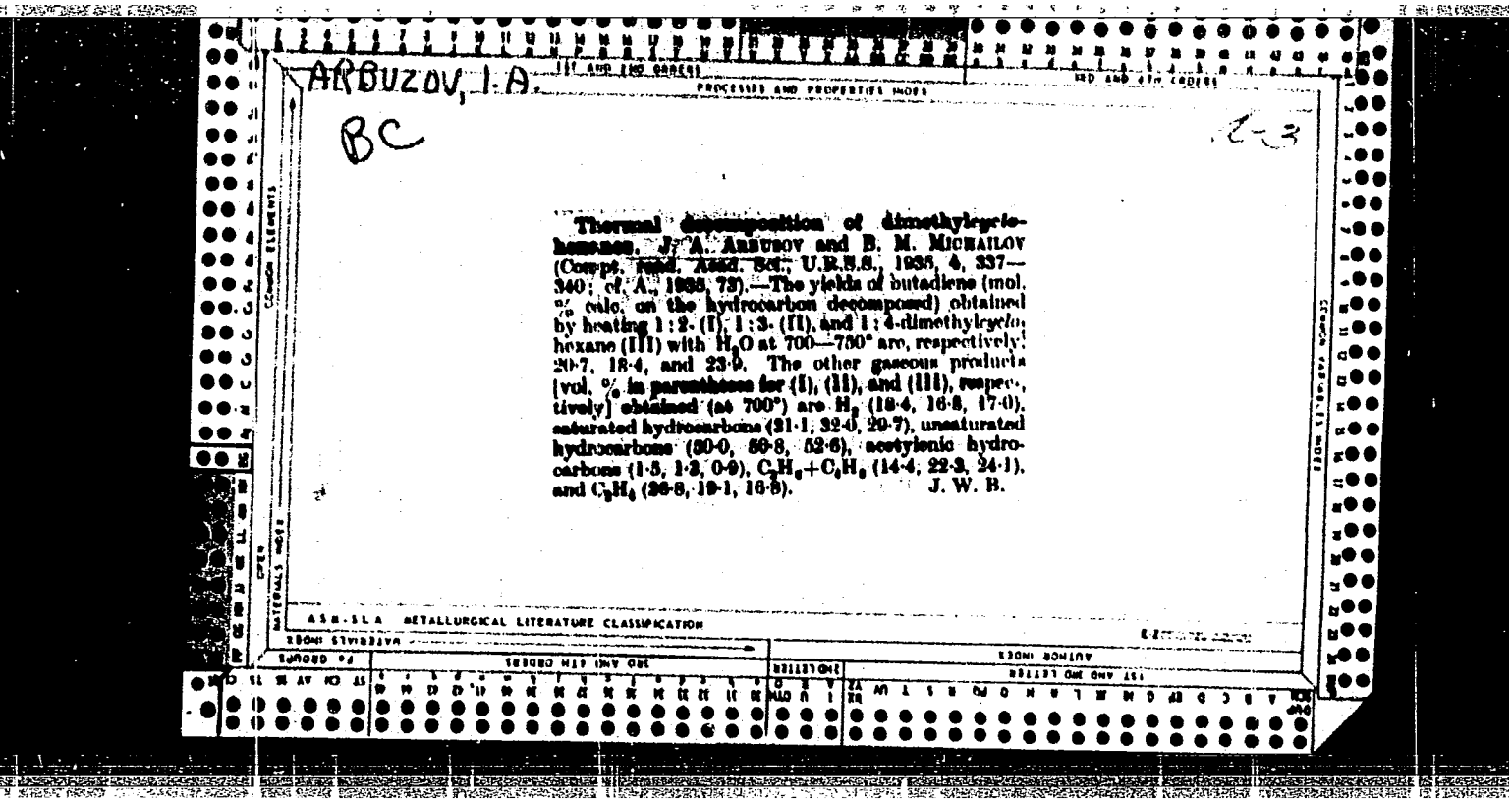

ARBUZOV, I.A.

BC

2-3

Thermal decomposition of dimethylcyclohexanes. J. A. ARBUZOV and B. M. MICHAILOV (Compt. rend. Acad. Sci. U.R.S.S., 1935, 4, 337—340; cf. A., 1935, 73).—The yields of butadiene (mol. % calc. on the hydrocarbon decomposed) obtained by heating 1 : 2- (I), 1 : 3- (II), and 1 : 4-dimethylcyclohexane (III) with H_2O at 700—750° are, respectively, 20·7, 18·4, and 23·9. The other gaseous products [vol. % in parentheses for (I), (II), and (III), respectively] obtained (at 700°) are H_2 (18·4, 16·8, 17·0), saturated hydrocarbons (31·1, 32·0, 29·7), unsaturated hydrocarbons (50·0, 50·8, 52·6), acetylenic hydrocarbons (1·5, 1·2, 0·9), $C_2H_6+C_4H_8$ (14·4, 22·2, 24·1), and C_3H_6 (26·8, 19·1, 16·8). J. W. B.

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ARBUZOV, I. A.

BC

a-3

Thermal decomposition of olefinic hydrocarbons. B. M. MICHAILOV and J. A. ARBUSOV (Compt. rend. Acad. Sci. U.R.S.S., 1934, 3, 423—426; cf. B., 1934, 383; this vol., 451).—Formation of condensation products during the pyrolysis of olefines is avoided by using a 0·5—1·0 sec. contact, and diluting to low partial pressure with steam. Δ^{α}-Pentene gave at 600° and 650°, respectively, H_2 1·0 and [illegible]% (by vol.), CH_4 16·2 and 17·6%, C_2H_4 30·0 and [illegible]%, C_2H_6 7·0 and 6·0%, propylene (I) 20·1 and 21·3%, C_3H_8 0·[illegible] and 0·0%, butadiene (II) 13·0 and 11·0%, with 7·7 and 5·6% of Δ^{α}- and Δ^{β}-butene (III); Δ^{β}-pentene gave, at 600° and 650°, respectively, H_2 0·6 and 0·7%, CH_4 47·[illegible] and 40·4%, C_2H_4 14·5 and 17·2%, C_2H_6 [illegible]·0 and [illegible]%, (I) [illegible] and 10%, (II) 15·5 and [illegible]%, (III) [illegible] and 0·0; Δ^{α}-hexene gave at 650° and 700°, respectively, H_2 1·8 and 2·4%, CH_4 11·2 and 11·9%, C_2H_4 40·8 and [illegible]·0%, C_2H_6 2·3 and [illegible]·4%, (I) 30·2 and 28·0%, (II) 4·3 and 5·8%, (III) [illegible]·9 and 10·5%; [illegible]-methyl-Δ^{α}-pentene at 550°, 600°, and 650°, respectively, H_2 [illegible]·2, 6·9, and 7·9%, CH_4 10·2, 9·3, and [illegible]·0%, C_2H_4 14·7, 17·0, and 16·3%, C_2H_6 3·2, 1·[illegible] and 0·9%, (I) 60·6, 59·3, and 56·4%, C_3H_8 0·0, 0·3, and 0·2%, (II) 0·6, 0·9, 1·9%, (III) 3·5, 4·1, and 5·3%, and isobutene 1·0, 1·0, and 1·1%.

R. C. M.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

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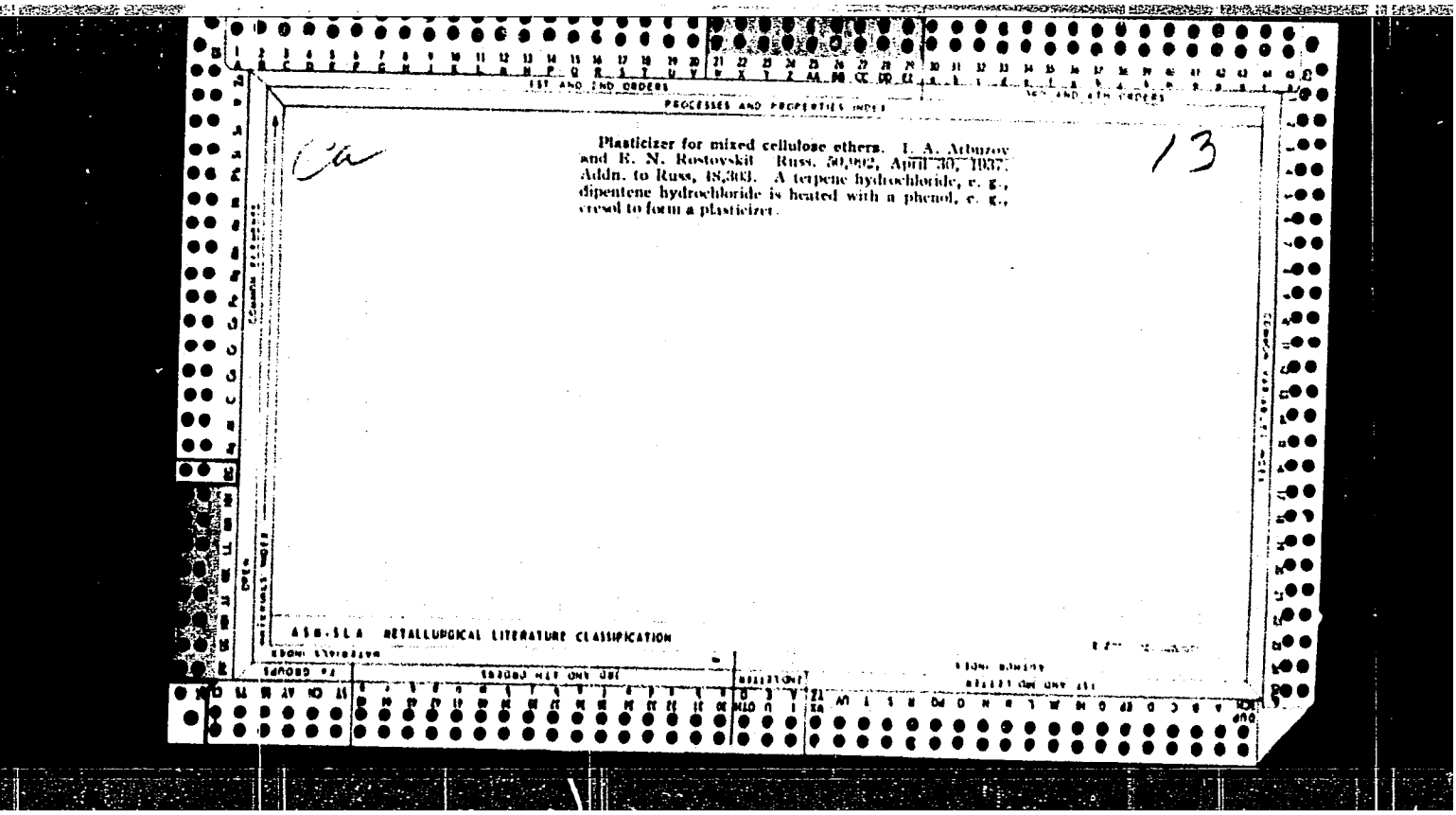

PROCESSES AND PROPERTIES INDEX

Ca

13

Plasticizer for mixed cellulose ethers. I. A. Arbuzov and R. N. Rostovskii Russ. 50,902, April 30, 1937. Addn. to Russ. 48,303. A terpene hydrochloride, e. g., dipentene hydrochloride is heated with a phenol, e. g., cresol to form a plasticizer.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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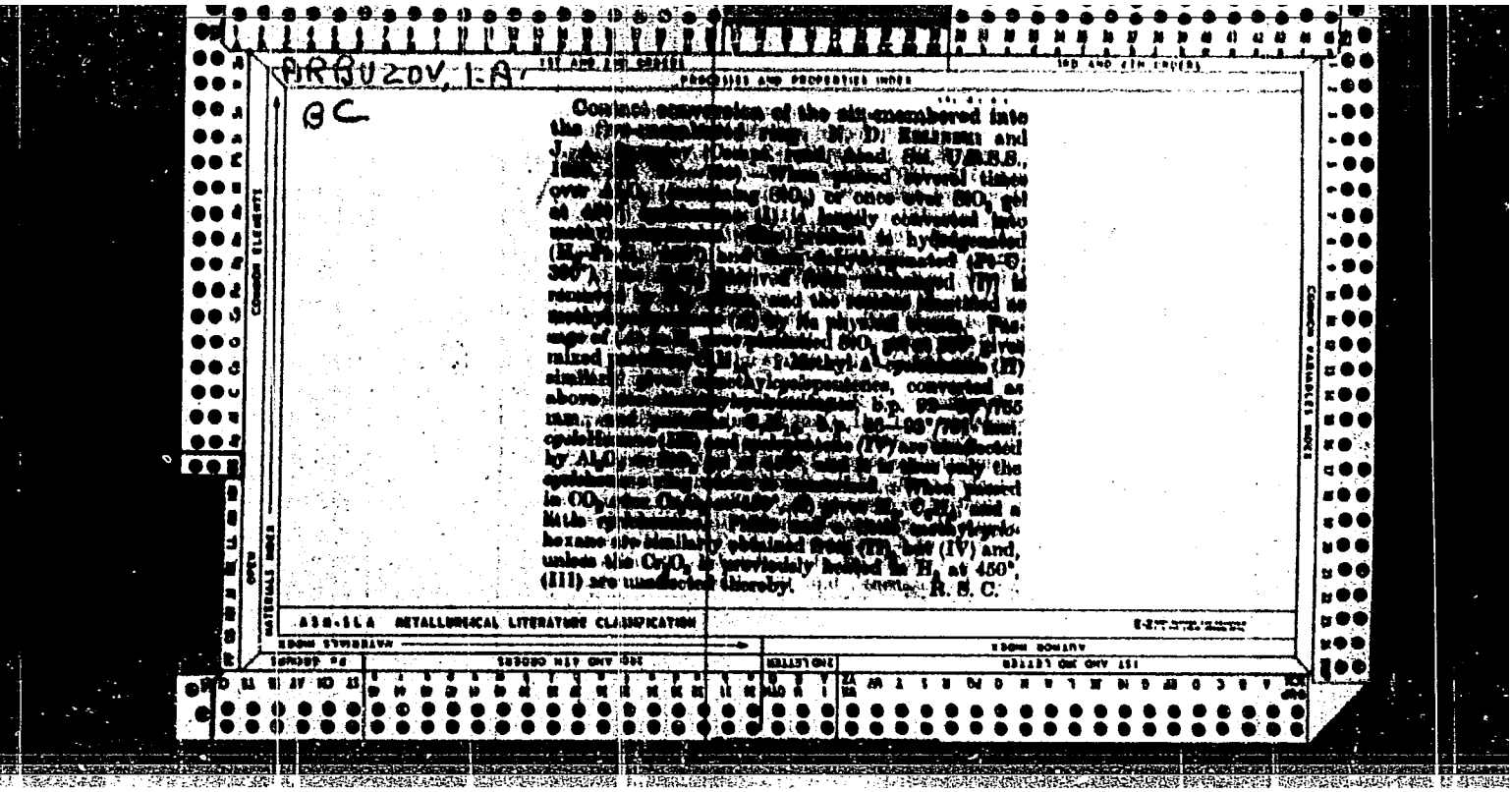

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ARBUZOV, I.A.

BC

PROCESSES AND PROPERTIES INDEX

Contact isomerisation of menthene. N. D. Zelinskii and I. A. Arbuzov (Compt. rend. Acad. Sci. U.R.S.S., 1939, 24, 542—544; cf. A., 1940, II, 9).—Δ^3-p-Menthene (I) passes in presence of SiO_2 gel at 375° [illegible] into an unsaturated material (II) which is hydrogenated (Pt-C at 190°) and then dehydrogenated (Pt-C at 300°) and treated with fuming H_2SO_4 to remove [illegible]. The product is a mixture of pentamethylene hydrocarbons, $C_{10}H_{20}$ (formed by hydrogenation of cyclopentene hydrocarbons, $C_{10}H_{18}$, which are the intermediate product of the contact isomerisation of (I)). Repeated passage of (II) over Pt–SiO_2 gel at 300° followed by treatment of the condensate with fuming H_2SO_4 leads to a mixture of isomeric decalins. H. W.

ASD-SLA METALLURGICAL LITERATURE CLASSIFICATION

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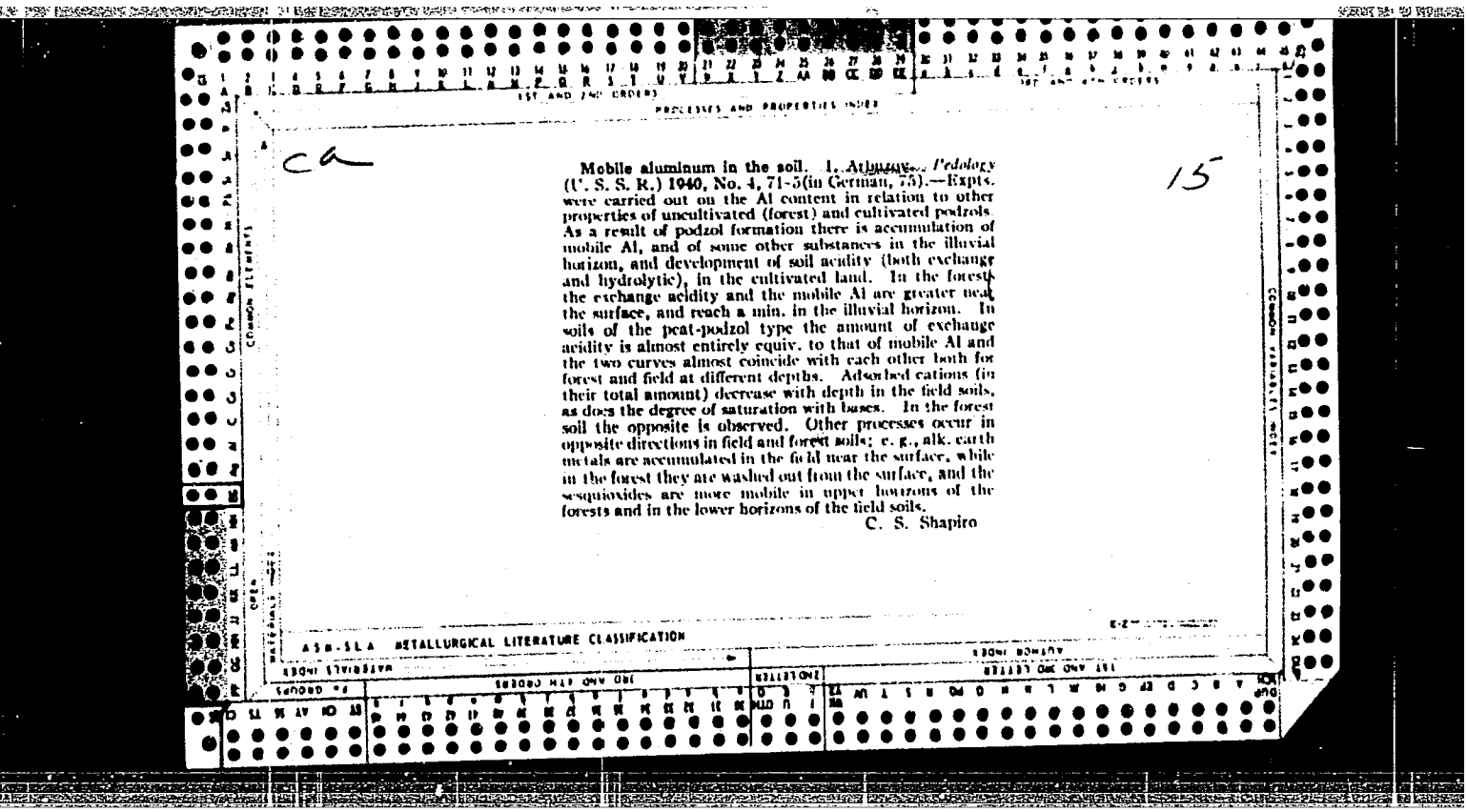

ca

15

Mobile aluminum in the soil. I. Atterberg. *Pedology* (U. S. S. R.) 1940, No. 4, 71-5(in German, 75).—Expts. were carried out on the Al content in relation to other properties of uncultivated (forest) and cultivated podzols. As a result of podzol formation there is accumulation of mobile Al, and of some other substances in the illuvial horizon, and development of soil acidity (both exchange and hydrolytic), in the cultivated land. In the forest the exchange acidity and the mobile Al are greater near the surface, and reach a min. in the illuvial horizon. In soils of the peat-podzol type the amount of exchange acidity is almost entirely equiv. to that of mobile Al and the two curves almost coincide with each other both for forest and field at different depths. Adsorbed cations (in their total amount) decrease with depth in the field soils, as does the degree of saturation with bases. In the forest soil the opposite is observed. Other processes occur in opposite directions in field and forest soils; e. g., alk. earth metals are accumulated in the field near the surface, while in the forest they are washed out from the surface, and the sesquioxides are more mobile in upper horizons of the forests and in the lower horizons of the field soils.

C. S. Shapiro

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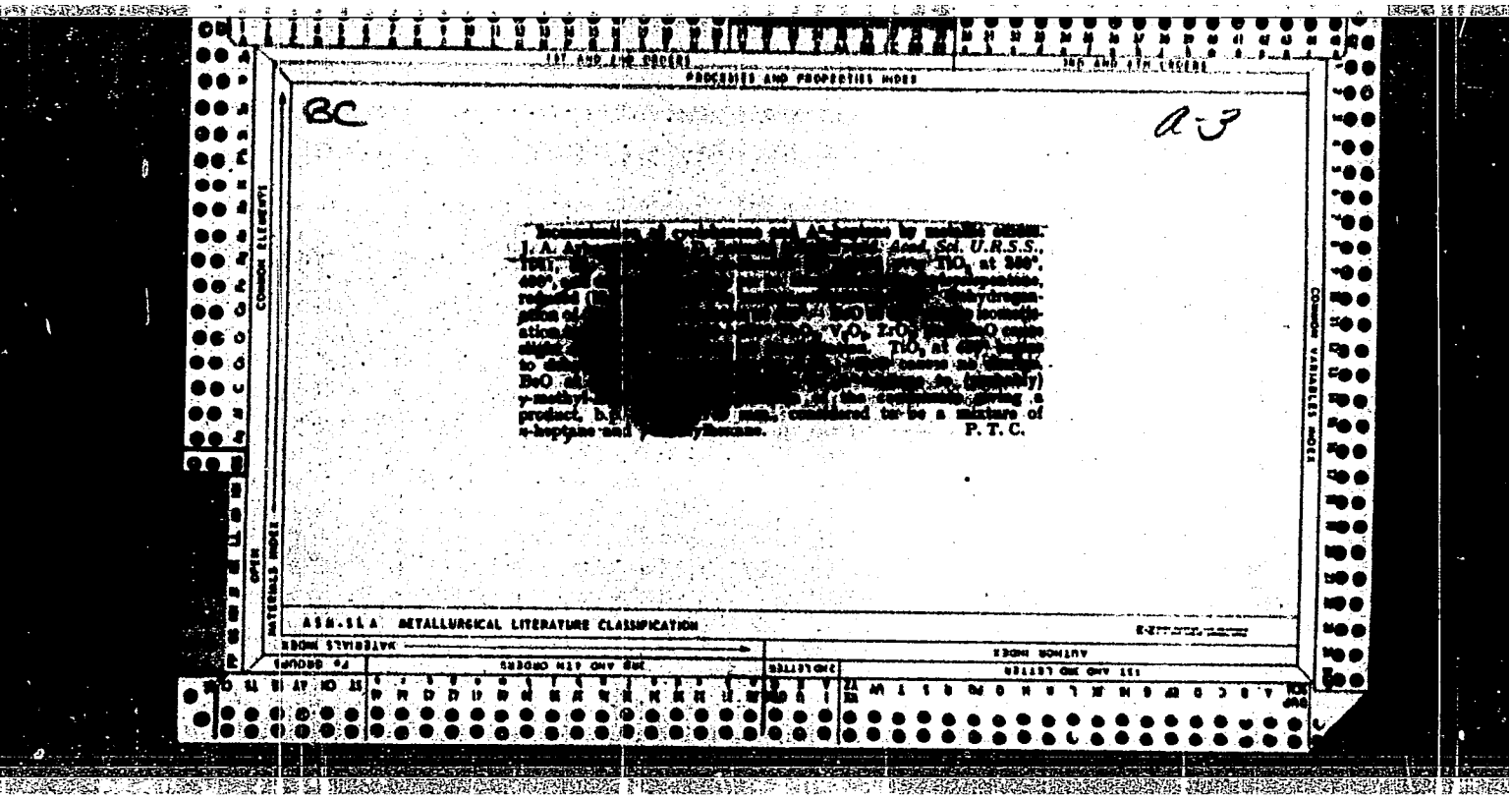

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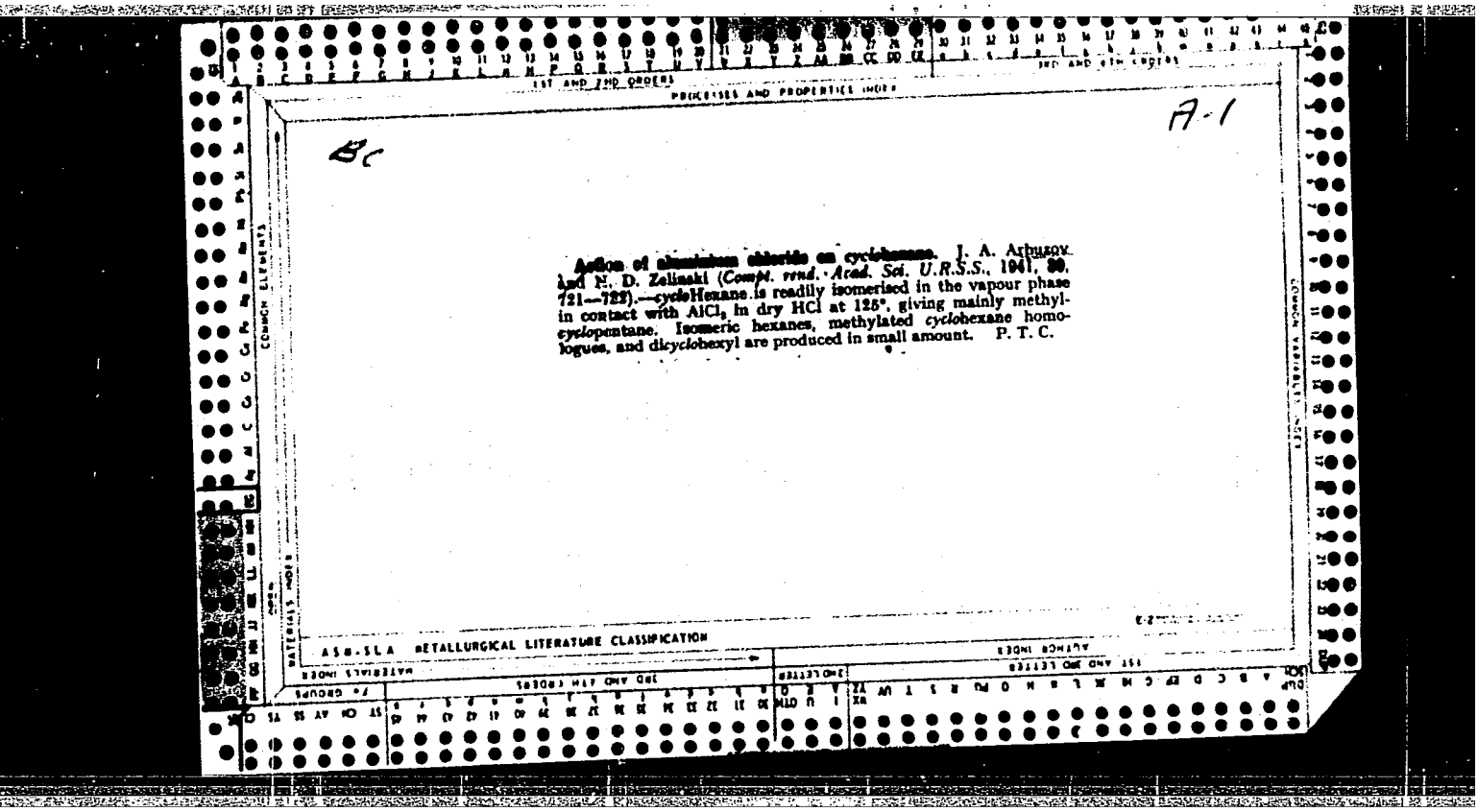

A-1

Bc

Action of aluminium chloride on cyclohexane. J. A. Arbuzov and N. D. Zelinski (*Compt. rend. Acad. Sci. U.R.S.S.*, 1941, **30**, 721—727).—*cyclo*Hexane is readily isomerised in the vapour phase in contact with $AlCl_3$ in dry HCl at 125°, giving mainly methylcyclopentane. Isomeric hexanes, methylated *cyclo*hexane homologues, and di*cyclo*hexyl are produced in small amount. P. T. C.

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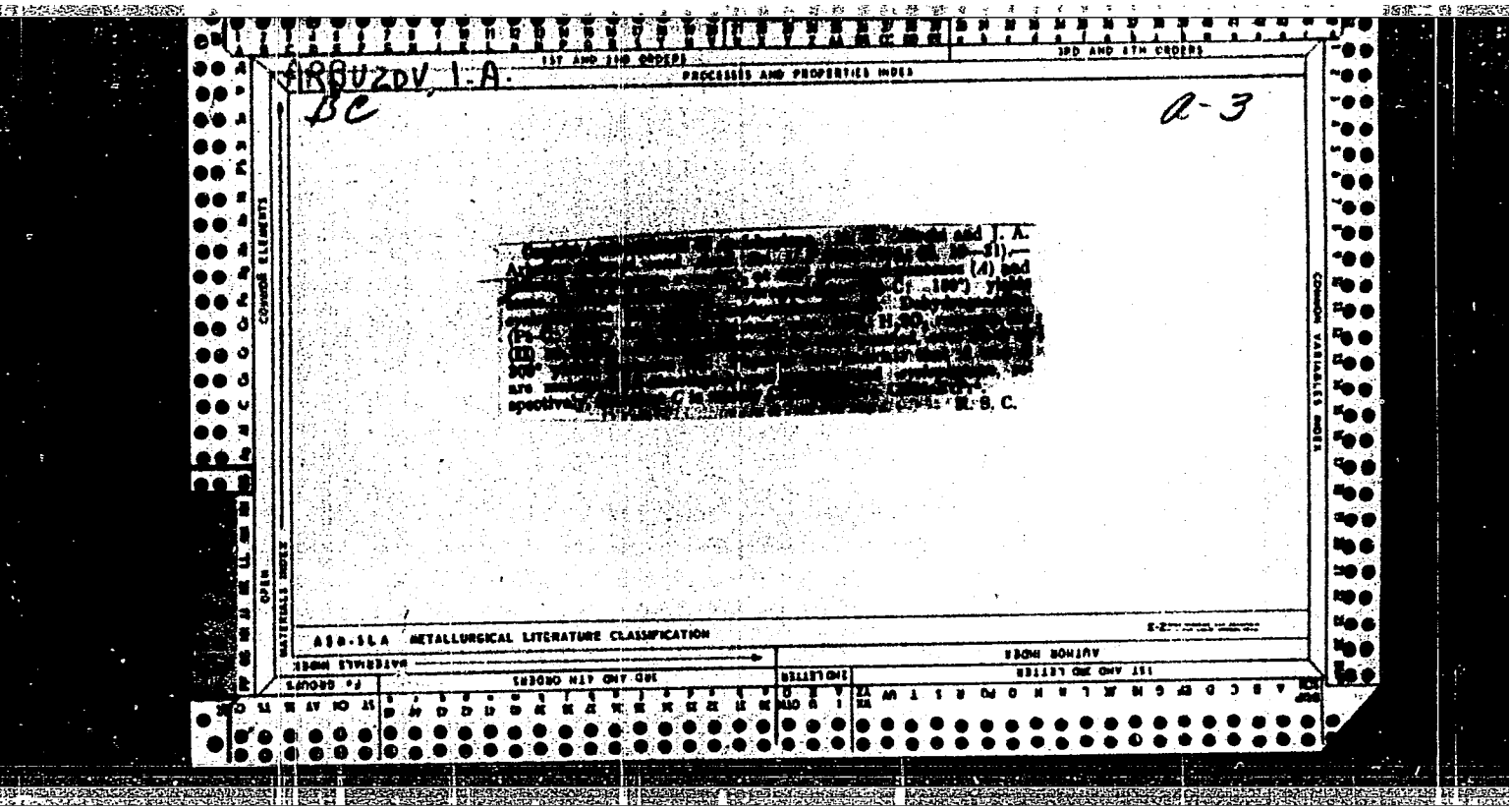

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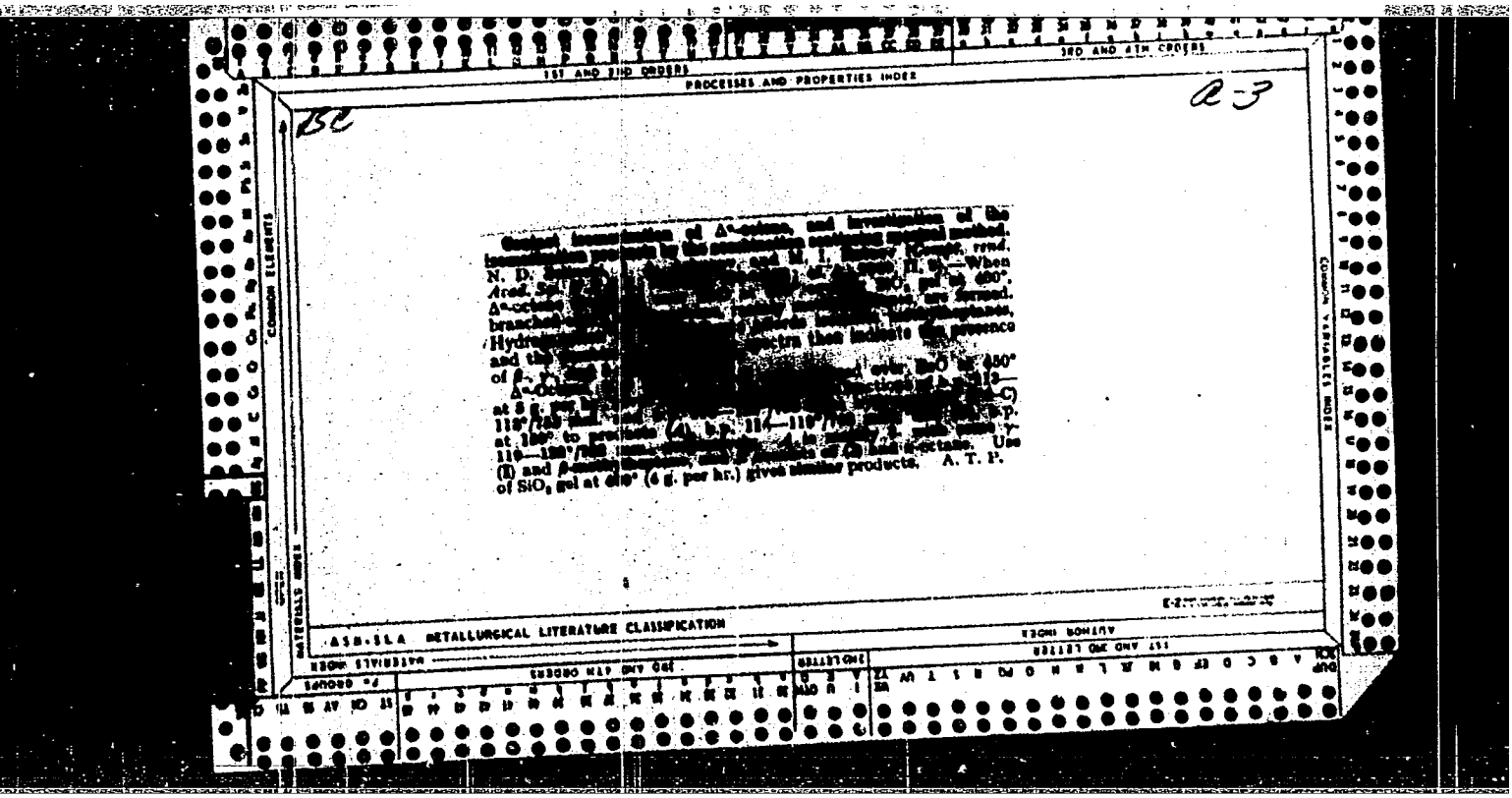

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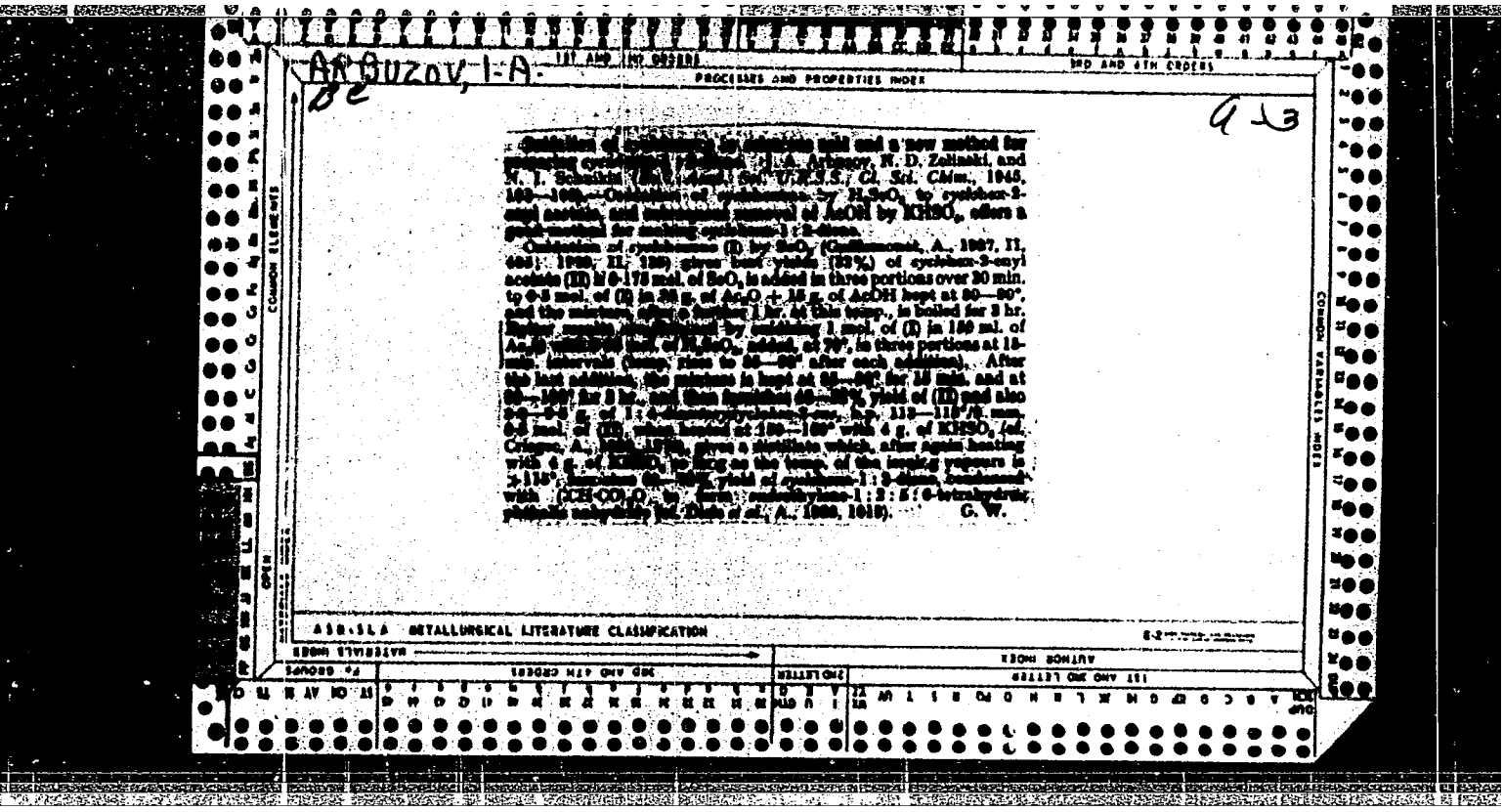

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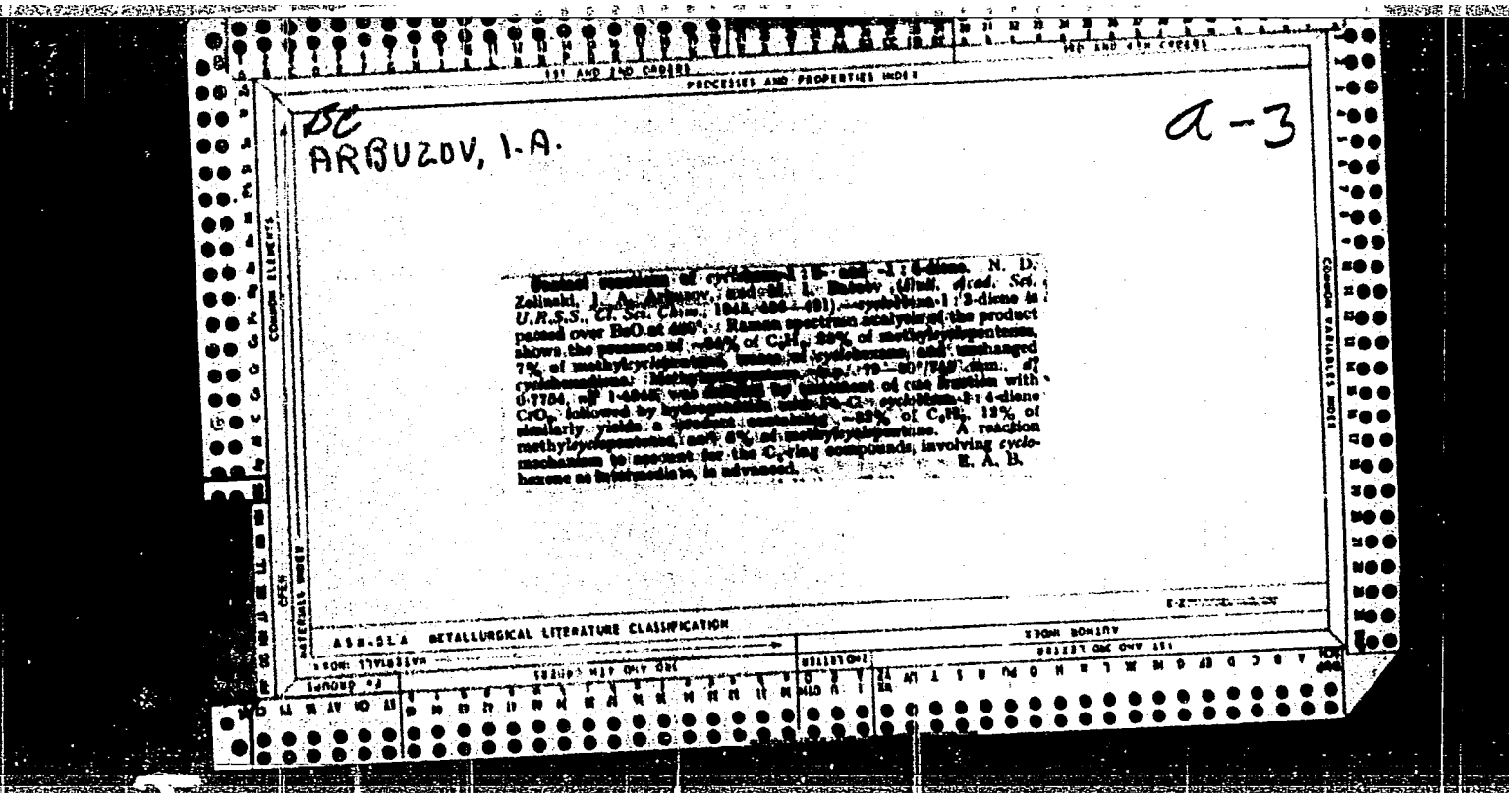

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

BC

a-3

[illegible] isomerisation of cyclohexane. I. A. Arbuzov, M. I. [illegible] and N. D. Zelinski (Bull. Acad. Sci. U.R.S.S., Class. Sci. Chim., 1943, [illegible]; cf. Zelinski et al., A., 1940, II, 9; 1942, II, [illegible]).—The products of the reaction on BeO at 400° of cyclohexane, passed [illegible] at 10·5 l. per hr., are studied by means of Raman spectra. The main product is 1-methylcyclo[illegible] with smaller amounts of 3-methylcyclopent-1-ene and [illegible]methylcyclopentane, and ~15 mol.-% of unchanged cyclohexane. It is considered probable that dicyclo[3, 1, 0]hexane is an intermediate product of the isomerisation. G. S. S.

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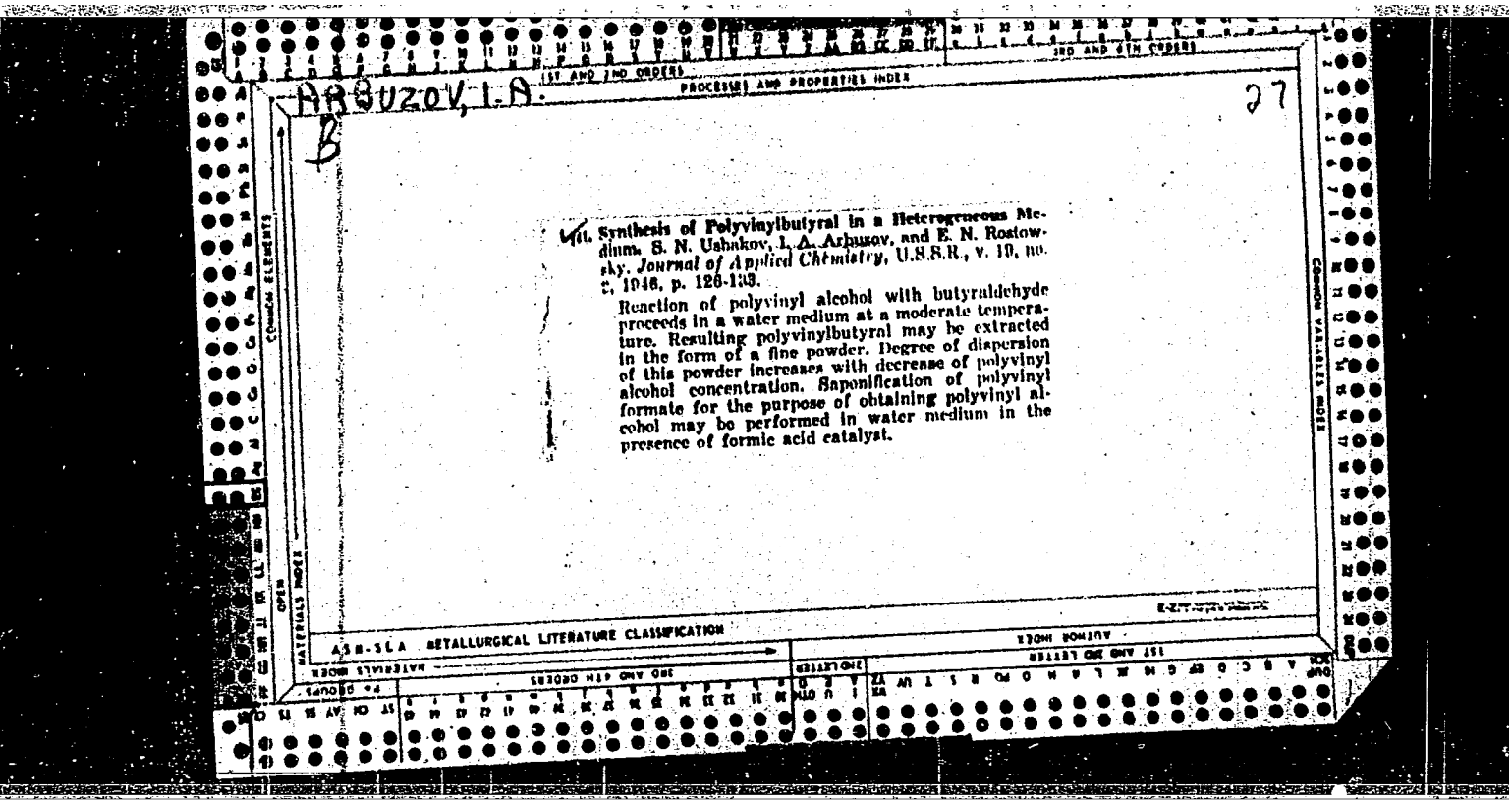
ARBUZOV, I.A.

B

27

Synthesis of Polyvinylbutyral in a Heterogeneous Medium. S. N. Ushakov, I. A. Arbusov, and E. N. Rostowsky. *Journal of Applied Chemistry*, U.S.S.R., v. 19, no. 2, 1946, p. 126-133.

Reaction of polyvinyl alcohol with butyraldehyde proceeds in a water medium at a moderate temperature. Resulting polyvinylbutyral may be extracted in the form of a fine powder. Degree of dispersion of this powder increases with decrease of polyvinyl alcohol concentration. Saponification of polyvinyl formate for the purpose of obtaining polyvinyl alcohol may be performed in water medium in the presence of formic acid catalyst.

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SULTANOV, K.; ARBUZOV, I.A.

Polymerization of divinyl acetals under the effect of ionic catalysts. Uzb. khim. zhur. 7 no.2:57-61 '63. (MIRA 16:8)

1. Institut khimii polimerov AN UzSSR.
(Butafiene) (Polymerization) (Catalysts)

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ARBUZOV, I. N.

Tree Planting

Operating tree planting machines SLCH-1. Les. khoz. 5 no. 3(42), 1952

Monthly List of Russian Accessions, Library of Congress, July 1952. Unclassified.

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KOZLIKOV, M.F., kand. tekhn. nauk; SMIRNOV, A.I., kand. tekhn. nauk;
ARBUZOV, I.P., inzh.

Mechanical drive for bar conveyors. Mekh. i elek. sots. sel'khoz. 21 no.5:37-40 '63. (MIRA 17:1)

1. Azovo-Chernomorskiy institut mekhanizatsii sel'skogo khozyaystva.

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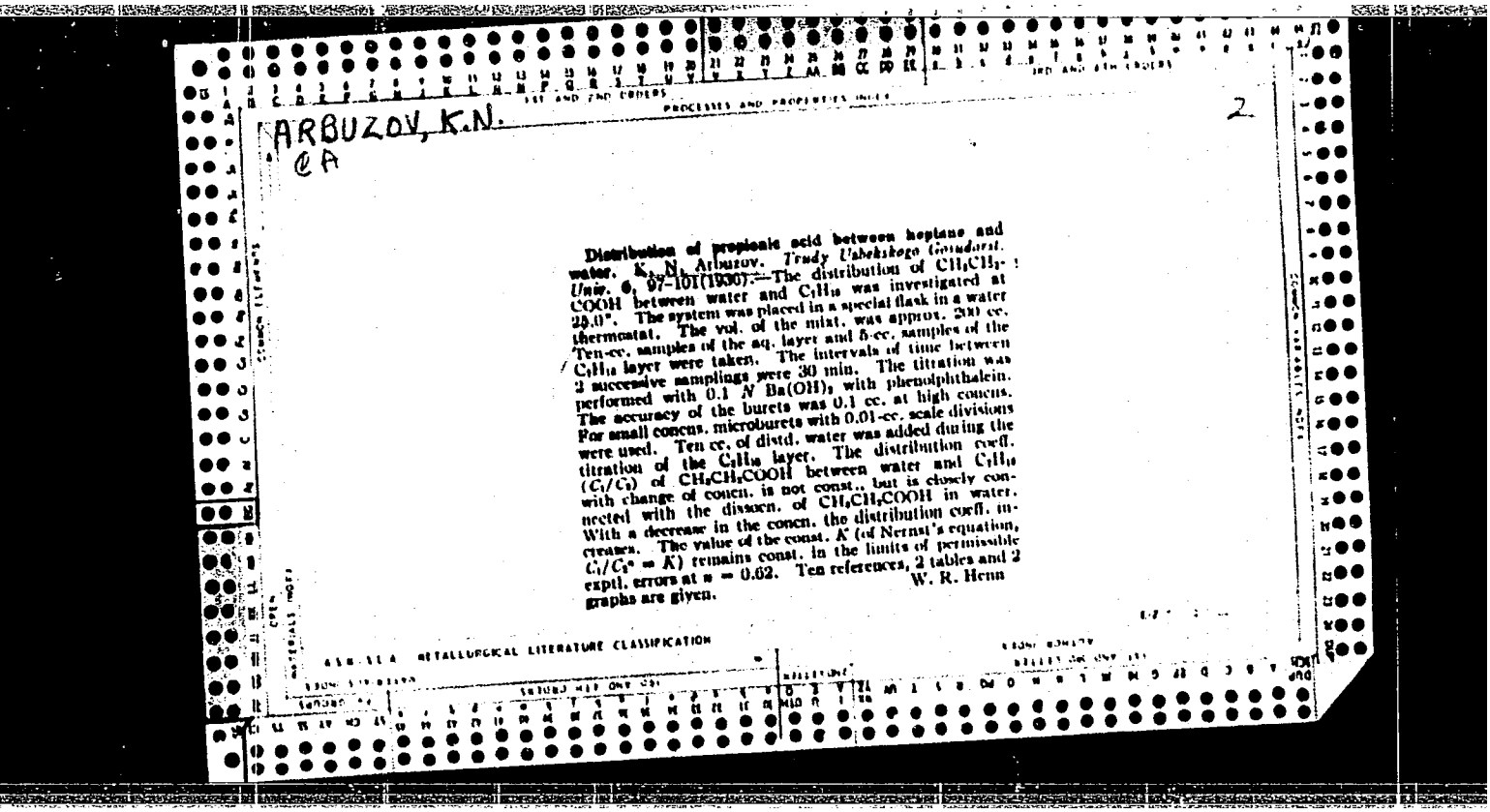

ARBUZOV, K.N.
CA

2

Distribution of propionic acid between heptane and water. K. N. Arbuzov. *Trudy Ubekskogo Gosudarst. Univ.* 6, 97–101(1936).—The distribution of CH_3CH_2-COOH between water and C_7H_{16} was investigated at 20.0°. The system was placed in a special flask in a water thermostat. The vol. of the mixt. was approx. 200 cc. Ten-cc. samples of the aq. layer and 5-cc. samples of the C_7H_{16} layer were taken. The intervals of time between 2 successive samplings were 30 min. The titration was performed with 0.1 *N* $Ba(OH)_2$ with phenolphthalein. The accuracy of the burets was 0.1 cc. at high concns. For small concns. microburets with 0.01-cc. scale divisions were used. Ten cc. of distd. water was added during the titration of the C_7H_{16} layer. The distribution coeff. (C_1/C_2) of CH_3CH_2COOH between water and C_7H_{16} with change of concn. is not const., but is closely connected with the dissocn. of CH_3CH_2COOH in water. With a decrease in the concn. the distribution coeff. increases. The value of the const. *K* (of Nernst's equation, $C_1/C_2^n = K$) remains const. in the limits of permissible exptl. errors at $n = 0.62$. Ten references, 2 tables and 2 graphs are given.

W. R. Henn

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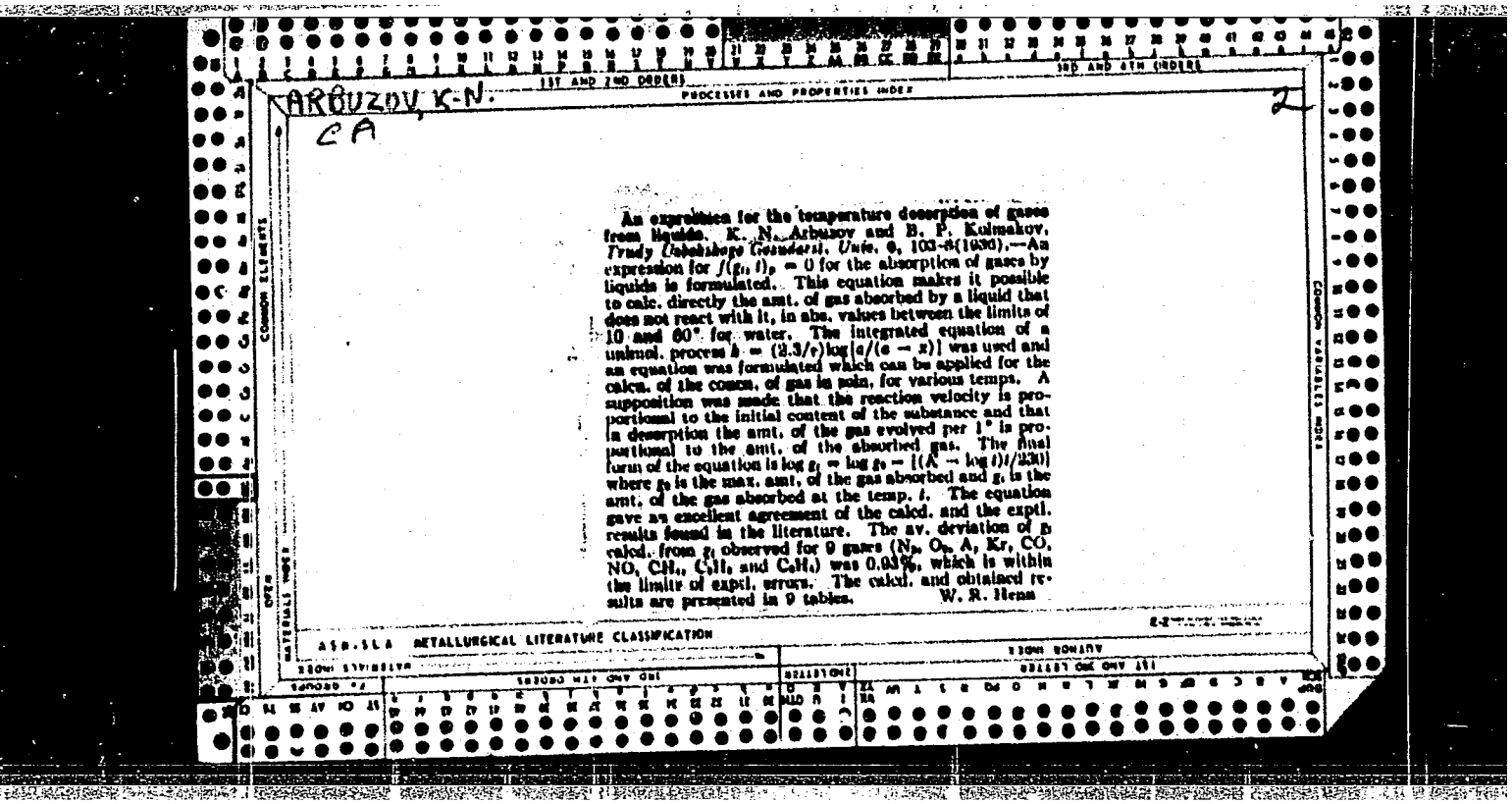

ARBUZOV, K-N.

CA

2

PROCESSES AND PROPERTIES INDEX

An expression for the temperature desorption of gases from liquids. K. N. Arbuzov and B. P. Kolmakov. *Trudy Tatarskogo Gosudarst. Univ.* 6, 103-8(1936).—An expression for $f(g_0, t)_p = 0$ for the absorption of gases by liquids is formulated. This equation makes it possible to calc. directly the amt. of gas absorbed by a liquid that does not react with it, in abs. values between the limits of 10 and 60° for water. The integrated equation of a unimol. process $k = (2.3/t)\log[a/(a - x)]$ was used and an equation was formulated which can be applied for the calcn. of the concn. of gas in soln. for various temps. A supposition was made that the reaction velocity is proportional to the initial content of the substance and that in desorption the amt. of the gas evolved per 1° is proportional to the amt. of the absorbed gas. The final form of the equation is $\log g_t = \log g_0 - [(A - \log t)t/230]$ where g_0 is the max. amt. of the gas absorbed and g_t is the amt. of the gas absorbed at the temp. t. The equation gave an excellent agreement of the calcd. and the exptl. results found in the literature. The av. deviation of g_t calcd. from g_t observed for 9 gases (N_2, O_2, A, Kr, CO, NO, CH_4, C_2H_6 and C_6H_6) was 0.03%, which is within the limits of exptl. errors. The calcd. and obtained results are presented in 9 tables. W. R. Henn

A59-51A METALLURGICAL LITERATURE CLASSIFICATION

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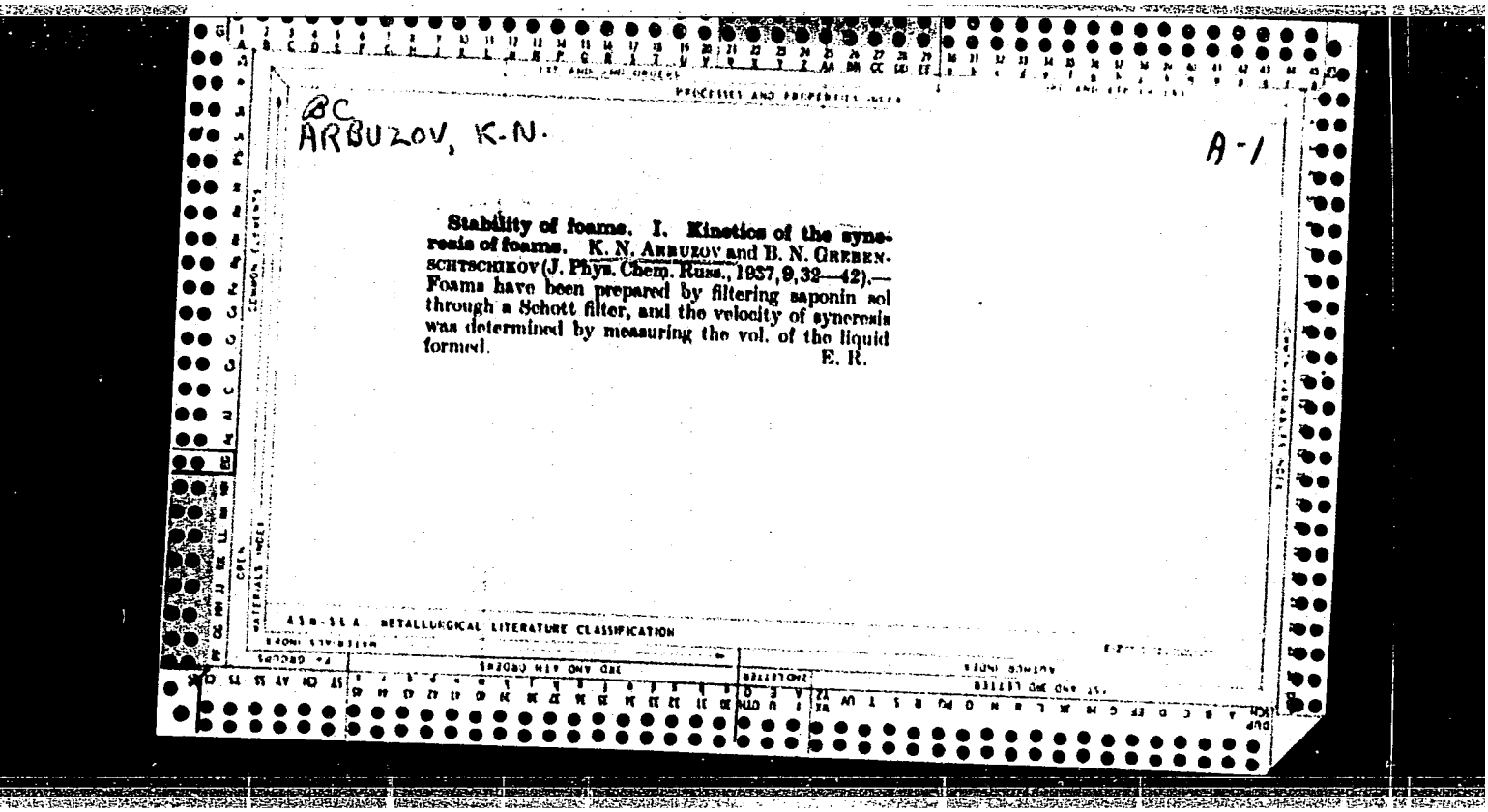

BC
ARBUZOV, K.N.

A-1

Stability of foams. I. Kinetics of the syneresis of foams. K. N. ARBUZOV and B. N. GREBENSCHTSCHIKOV (J. Phys. Chem. Russ., 1937, 9, 32—42).—Foams have been prepared by filtering saponin sol through a Schott filter, and the velocity of syneresis was determined by measuring the vol. of the liquid formed.

E. R.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

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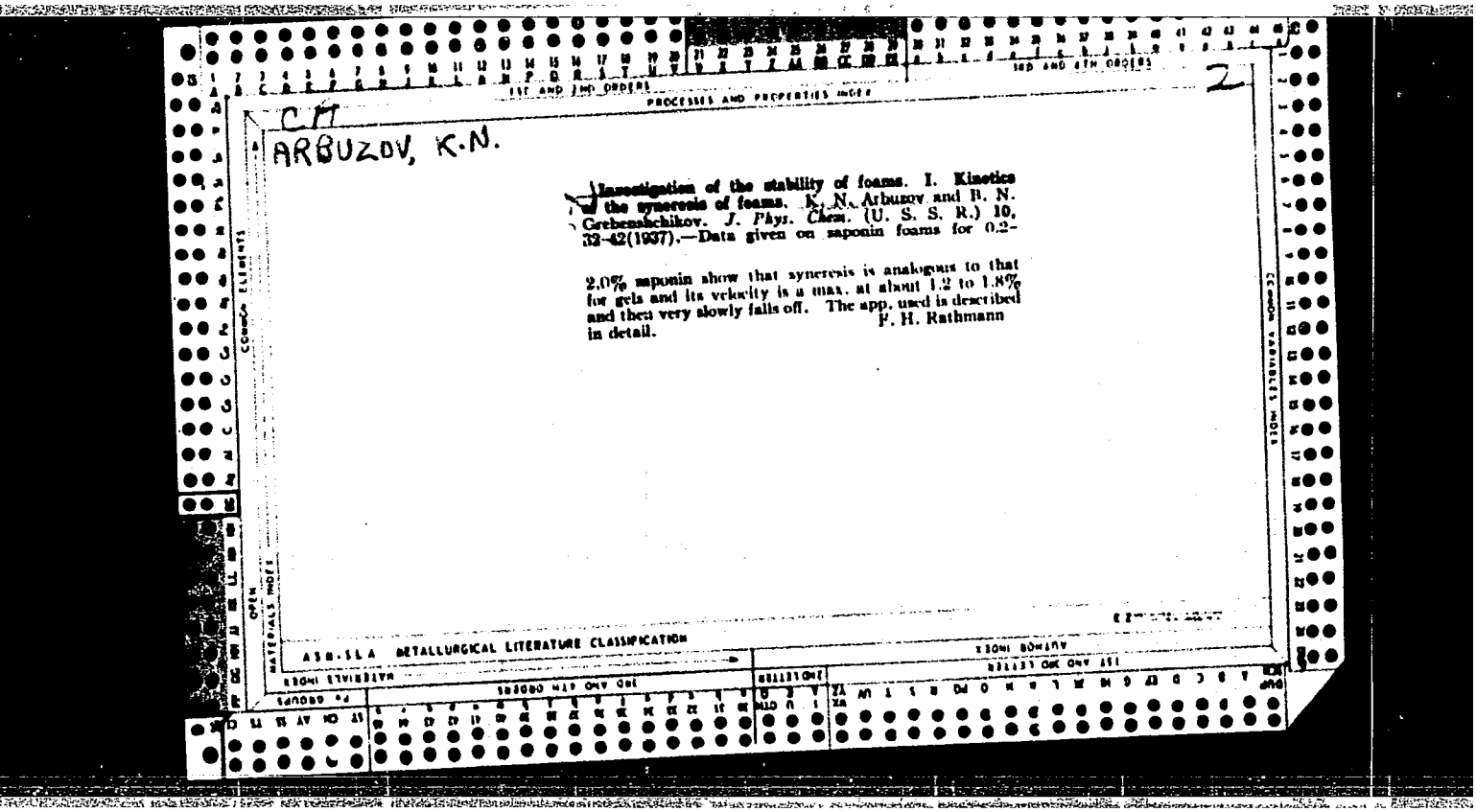

CM

ARBUZOV, K.N.

Investigation of the stability of foams. I. Kinetics of the syneresis of foams. K. N. Arbuzov and B. N. Grebenshchikov. *J. Phys. Chem.* (U. S. S. R.) 10, 32-42(1937).—Data given on saponin foams for 0.2-2.0% saponin show that syneresis is analogous to that for gels and its velocity is a max. at about 1.2 to 1.8% and then very slowly falls off. The app. used is described in detail.

P. H. Rathmann

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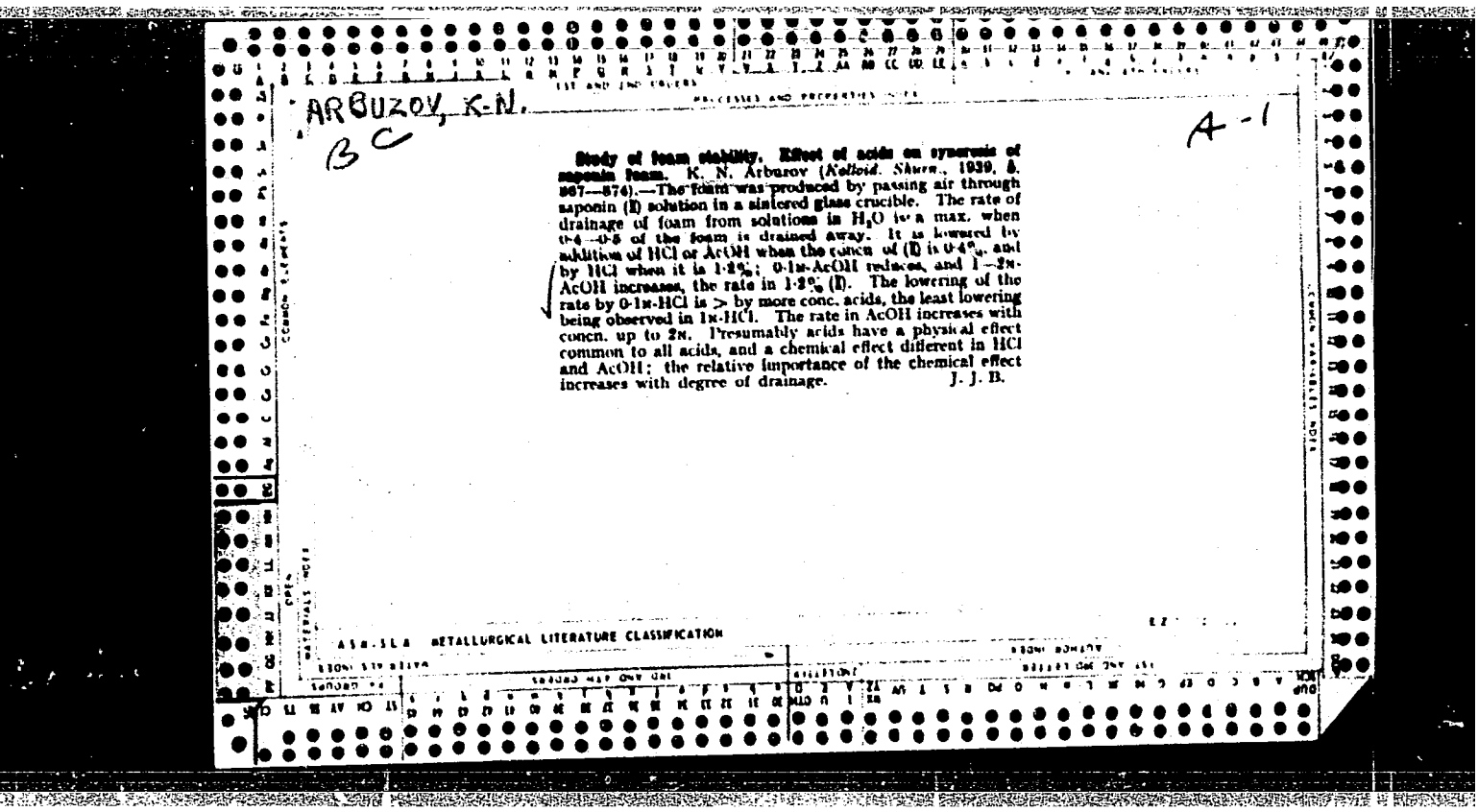

ARBUZOV, K.N.

B C

A-1

Study of foam stability. Effect of acids on syneresis of saponin foam. K. N. Arbuzov (*Kolloid. Shurn.*, 1939, 5, 867—874).—The foam was produced by passing air through saponin (I) solution in a sintered glass crucible. The rate of drainage of foam from solutions in H_2O is a max. when 0·4—0·5 of the foam is drained away. It is lowered by addition of HCl or AcOH when the concn. of (I) is 0·4%, and by HCl when it is 1·2%; 0·1N-AcOH reduces, and 1—2N-AcOH increases, the rate in 1·2% (I). The lowering of the rate by 0·1N-HCl is > by more conc. acids, the least lowering being observed in 1N-HCl. The rate in AcOH increases with concn. up to 2N. Presumably acids have a physical effect common to all acids, and a chemical effect different in HCl and AcOH; the relative importance of the chemical effect increases with degree of drainage. J. J. B.

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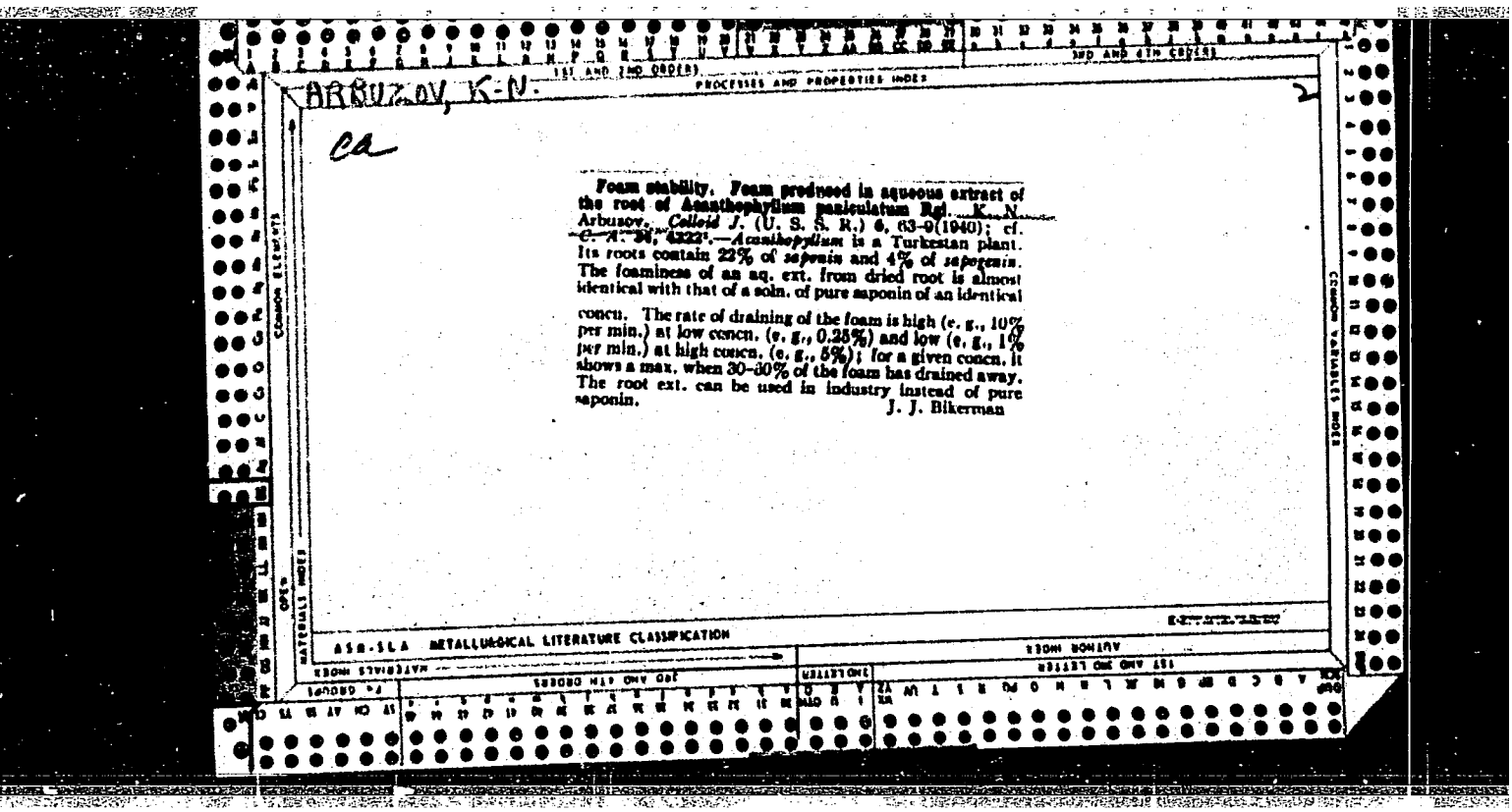

ARBUZOV, K-N.

ca

Foam stability. Foam produced in aqueous extract of the root of Acanthophyllum paniculatum Bgl. K. N. Arbuzov, *Colloid J.* (U. S. S. R.) 6, 63-9(1940); cf. *C. A.* 34, 4222⁹.—*Acanthophyllum* is a Turkestan plant. Its roots contain 22% of *saponin* and 4% of *saponasin*. The foaminess of an aq. ext. from dried root is almost identical with that of a soln. of pure saponin of an identical concn. The rate of draining of the foam is high (e. g., 10% per min.) at low concn. (e. g., 0.25%) and low (e. g., 1% per min.) at high concn. (e. g., 5%); for a given concn. it shows a max. when 30–50% of the foam has drained away. The root ext. can be used in industry instead of pure saponin.

J. J. Bikerman

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV, K.N., dots.; BAYHEKOVA, Z.K., assistent; KUDRINA, N.I., assistent

Extracting saponin from plants found in Uzbekistan. Nauch. trudy Samark. inst. sov. torg. 8:261-266 '57. (MIRA 12:7)
(Saponin)

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

POLYAKOV, A.A., prof.; CHEPUROV, K.P., prof.; ARBUZOV, K.N., dotsent; TRZHETSETSKAYA, T.A., mladshiy nauchnyy sotrudnik

Disinfecting seeds with nitrogen dioxide. Zashch. rast. ot vred. i bol. 5 no.4:38-39 Ap '60. (MIRA 13:9)
(Seeds--Disinfection) (Nitrogen oxides)

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

POLYAKOV, A.A.; TRZHETSETSKAYA, T.A.; ARBUZOV, K.N.; CHEPUROV, K.P.; KUDRINA, N.I.

Bactericidal effect of nitrogen dioxide on the saprophytic and pathogenic microflora. Trudy Uz.nauch.-issl.inst.vet. 14:85-89 '61. (MIRA 16:2)

(Bactericides) (Nitrogen oxides)

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

POLYAKOV, A.A.; TRZHETSETSKAYA, T.A. [Trzhetsets'ka, T.A.]; ARBUZOV, K.N.; AKHUMOVA, A.A.; CHEPUROV, K.P.

Bactericidal action of nitrogen dioxide on the vegetative and sporous forms of Bac. anthracis. Mikrobiol. zhur. 24 no.6: 43-45 '62. (MIRA 17:5)

1. Poltavskiy sel'skokhozyaystvennyy institut, kafedra mikrobiologii.

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV, Yu.N.; ARBUZOV, L.S.; GIDALEVICH, B.A ; POPOV, V.S., red.; NATSIK, P.T., red.; YAITSKIY, G.G., red.; KOMENDANT, K.P., red.

[Building materials of Kherson Province; mineral raw material base] Stroitel'nye materialy Khersonskoi oblasti; mineral'no-syr'evaia baza. Kiev, Gosstroiizdat USSR, 1964. 102 p. (MIRA 17:9)

1. Dneprogeologiya, trust.

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV,M.; ROGOV,I.

Study of carbides separated from tempered steel. Sbor. nauch. rab. Lab. metallofiz. no.1:66-71 '48.
(Carbides) (MLRA 8:9)

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV, M.P.

Texture of rolled steel. Akad. Nauk Ukr. S.S.R., Lab. Metallofiz., Sbornik Nauch. Rabot Lab. Metallofiz. '48, 72-5. (MLRA 3:2)
(CA 47 no.22:12190 '53)

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV M. P.

FA 151T97

USSR/Physics - Metallophysics
Steel, Carbide

Oct 49

"The Carbide State of Tempered Steel," M. P. Arbuzov, Lab of Metallophys, Acad Sci Ukrainian SSR, Kiev, 7 pp

"Zhur Tekh Fiz" Vol XIX, No 10

Results of X-ray study of carbide powders extracted from steel tempered at temperatures 400-680°. Carbide which forms in tempering at 400° has a rhombic lattice with constants which do not differ from the constants of the cementite lattice of annealed steel. Changes in the interference picture observed

USSR/Physics - Metallophysics (Contd) Oct 49

on the roentgenograms for changes of the tempering temperature are explained by the lamellar form and degree of dispersion of crystal particles of the carbide separating out. Submitted 4 Sep 48.

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV, M.P.

CA

9

State of the carbon in slowly and rapidly cooled technical iron. E. G. Arintsev and M. P. Arbuzov. (Metal Phys. Lab., Acad. Sci. Ukr. S.S.R., Kiev). *Zhur. Tekh. Fiz.* 20, 27-31(1950).—Steel samples contg. 0.1, 0.058, 0.042, and 0.02% C were kept at 700° and then either cooled slowly to room temp. or rapidly by immersion in a 10% NaOH soln. The heat-treated samples were then dissolved anodically either in a *N* KCl soln. with 0.5% citric acid or in 0.5 *N* HCl soln., at a c.d. of not over 0.03 amp./sq. cm., for not over 8 hrs., at about 0°, and the undissolved carbide was scraped off the surface under water, allowed to settle, dried, and examd. in x-ray diffraction. The amt. of carbide collected decreases with the amt. of C in the steel. Rapidly cooled samples give less carbide than slowly cooled. No carbide was collected from steel with 0.02% C. Rapidly cooled 0.042% C steel, heated up again to 700° and kept at that temp. for 2 hrs., and then cooled slowly, gave the same amt. of carbide as an originally slowly cooled 0.042% C steel. X-ray patterns of slowly cooled 0.1% C steel gave typical sharp lines of Fe_3C; these lines were somewhat more diffused in the carbide collected from rapidly cooled steel of the same compn. Sharp lines of Fe_3C were obtained also with carbide from slowly cooled 0.058 and 0.042% C steels; these lines were faint and diffuse in rapidly cooled 0.042% C steel. The Fe_3C lines are accompanied by lines of Fe_2O_3 and Fe_3O_4. The carbide phase of slowly cooled steel with 0.1–0.042% C consists of relatively fine crystals with a small amt. of coarser grains. The presence of highly dispersed crystals in carbide from rapidly cooled steel indicates that they are formed during the cooling. The absence of sep. spots on the lines of rapidly cooled 0.042% C steel and their presence in slowly cooled samples indicates that at the moment of quenching all or almost all C is in soln. The fine crystallites, formed at higher temps., have time to grow during slow cooling. On rapid cooling, not all the C has time to sep., and part of it remains in supersatd. soln. From the fact that no carbide is collected from a 0.02% C steel, it is inferred that, roughly, 0.03% C can remain in soln.

N. Thon

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CA

9

State of the carbide formed in isothermal decomposition of austenite. E. G. Azintsev and M. P. Arbuzov (Metal Phys. Lab., Acad. Sci. Ukr. S.S.R., Kiev). *Zhur. Tekh. Fiz.* 20, 32-7(1950).—Steel samples with 1.2% C were kept 30 min. at 1180° and were then transferred for 2 hrs. to baths kept at 650, 600, 500, 480, 410, 370, 340, 310, and 270°, then cooled in air, etched, and attacked anodically in 0.5 *N* HCl; the carbide thus collected (cf. preceding abstr.) was examd. by x-ray diffraction. All samples, irrespective of the temp. of the decompn. of the austenite, showed the same lines of the orthorhombic lattice of cementite. The Fe_3C collected from austenite decompd. at 600° and higher consists of crystallites not smaller than 10^{-4} cm. Judging by the broadening of the interference lines of Fe_3C from samples kept at 500° and below, the crystallites are smaller than 10^{-6} cm., and the dispersity increases with decreasing temp. of the decompn. The dimensions of the Fe_3C crystals are smaller in the [001] than in the other directions. It can, therefore, be concluded that at lower decompn. temps. the Fe_3C crystals sep. in the form of plates parallel to the [001] face. Fe_3C crystallites from decompn. at 340° have an estd. size of a few at. layers in the [001] direction, and a few hundreds of at. layers in the [010] and [100] directions. Fe_3C from decompd. austenite have approx. the same size as Fe_3C from steel quenched from a 30-40° higher temp.

N. Thon

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CA ARBUZOV, M-P.

2

Crystal structure and particle size of the carbide phase in tempered steel. M. P. Arbuzov (Acad. Sci., Ukr. S.S.R., Kiev). *Doklady Akad. Nauk S.S.S.R.* 73, 83-6(1950).—X-ray line widths were measured photometrically for carbide residues from 1% C steels tempered at 50° intervals from 100 to 700°. The calcd. size and shape of the carbide particles showed that in the range 300 to 350° the *c* dimension of the carbide is only about 10 lattice spacings and is about 1/5 as large as the *a* or *b* dimension. Growth in all dimensions occurred above 350° and the difference between *c* and *a* or *b* decreased. Some x-ray lines present above 400° disappeared below this temp. No lines were present in the pattern of carbides from the steel tempered at 150°. Even in steels tempered at low temps. the carbide phase, Fe_3C, has the lattice of Fe_3C. The difference in diffraction patterns between Fe_3C and Fe_3C is caused by the platelet form and the small dimensions of Fe_3C. The change that occurs in the range 300 to 400° is partly caused by changes in the interaction of the carbide and the solid soln. A. G. Guy

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CA ARBUZOV, M.P.

9

Structure of martensite electrolytically separated from quenched steel. M. P. Arbuzov. *Doklady Akad. Nauk S.S.S.R.* 74, 1085-7(1950).—Expt. studies were made of quenched C steels contg. 0.80, 0.98, 1.16, 1.38, and 1.51% C. The steels were dissolved in solns. of HCl or of KCl and citric acid to obtain a residue of martensite. X-ray patterns were obtained on cylindrical specimens 1 mm. in diam. of the pressed residue by using Fe radiation and a camera 114.6 mm. in diam. Comparison patterns were obtained from a quenched, 0.98 C steel specimen. Annealed pure Fe filings was the calibration standard. The presence of retained austenite permits the electrolytic sepn. of martensite, since the austenite can be preferentially dissolved. The resulting martensite residue has a tetragonal lattice. The x-ray lines from the steel specimen were more diffuse than those from the corresponding residue, but the lattice const. values were the same. Thus, the tetragonality of martensite is not due to lattice strain, but is a result of interaction of C and Fe atoms on the martensite lattice.

A. G. Guy

1951

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

CA ARBUZOV, M.P.

Crystal structure of the carbide in carbon-contg. steel in different phases of anneal. M. P. Arbuzov. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 15, 18–21(1951).—X-ray investigation of carbide powders, obtained from steel with 1% C, cooled for 2 hrs. at 700° to 100° C. in 50° intervals shows that the carbide Fe_3C formed at a temp. below 400° has the rhombic lattice of cementite and the shape of very small plates. These small crystals at temp. beyond 400° grow into the larger crystals of cementite. S. P.

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ARBUZOV, M.P.

(3) met

J. of the Iron & Steel Inst.
Feb 1954 Metallography

The Structure of Martensite Crystals in Hardened Steel. M. P. Arbuzov, L. I. Lysak, and E. G. Nesterenko. (*Doklady Akademii Nauk, S.S.S.R.*, 1953, 90, (3), 375–377). [In Russian]. X-ray photographs were made of electrolytically isolated martensite from a hardened 0·98%-carbon steel using iron radiation. It is concluded from measurements of intensity and line width that: (1) The size of the area of coherent dispersion is small ($2-3\times10^{-4}$ cm.); and (2) the mean value of the square of the displacement in the direction of the c axis is twice that in the direction of the *a* axis.—T. G.

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

Name: ARBUZOV, Moisey Petrovich

Dissertation: Physical Nature of the Processes of Steel Tempering

Degree: Doc Phys-Math Sci

Affiliation: Inst of Metal Physics, Acad Sci UkSSR

Defense Date, Place: 2 Apr 55, Council of Inst of Physics and Mathematics, Acad Sci UkSSR

Certification Date: 1 Dec 56

Source: BMVO 6/57

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV, M. P.

"On the Conditions of Equilibrium Between the Separted and the Initial Phases"

An article in the book "Questions on the Physics of Metals and Metal Science," AS Ukr. SSR Kiev, 1955. 151 pp

So: Sum. No. 1102, 19 Oct 56

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV, M. P.

"Kinetics of the Growth of Carbide Phase Crystals During Isothermic Tempering"

An article in the book "Questions on the Physics of Metals and Metal Science" As Ukr. SSR, Kiev, 1955, 151 pp.

So: Sum No. 1102, 19 Oct 56

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV, M. P

Growth kinetics of the carbide phase crystals (blocks) dur-

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predstavlen akademik G. V. Kurdyumov

(austenite)

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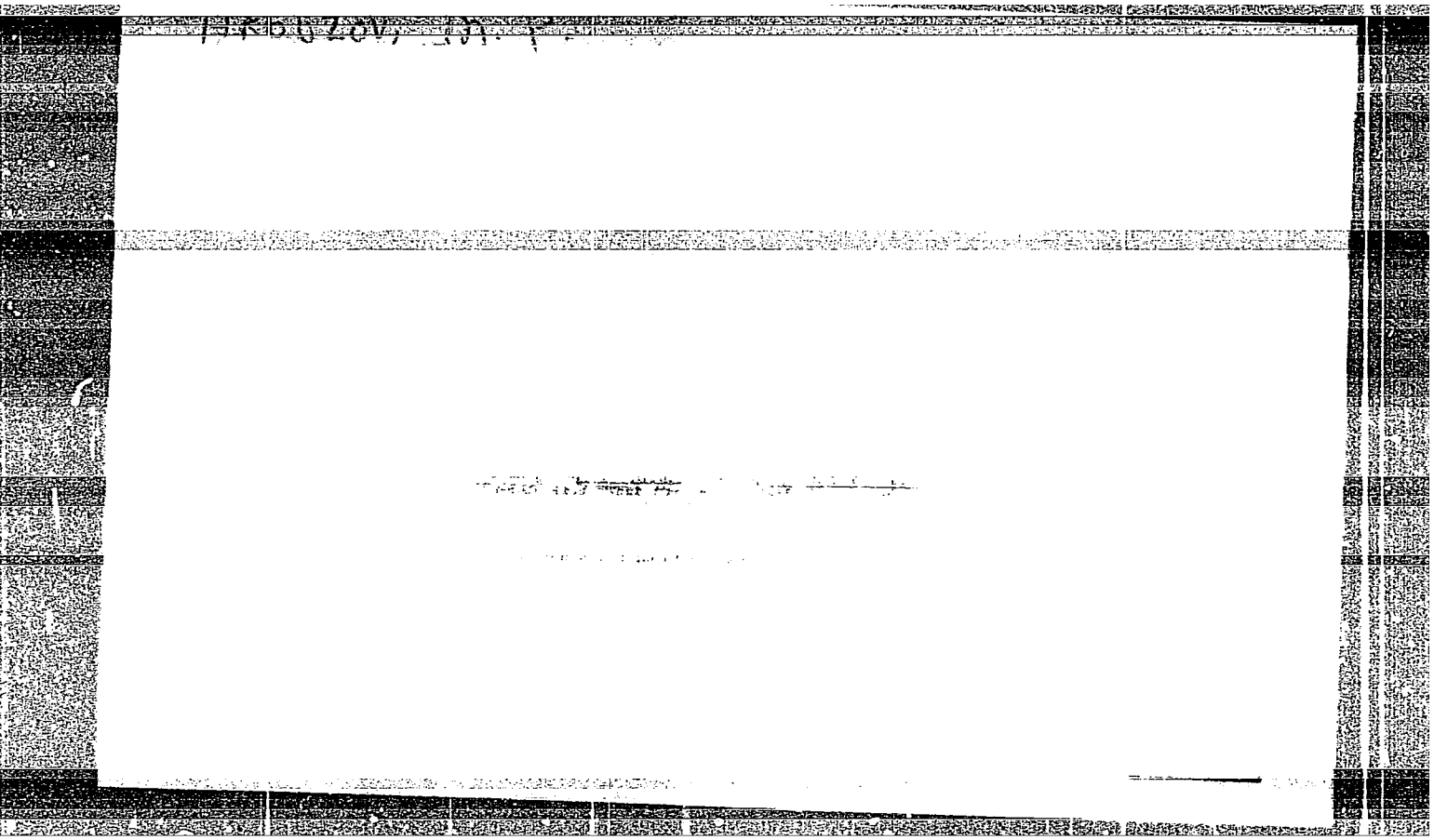

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ARBUZOV, M. P.

... summary).—Steel plates, 50 mm. diam. and 5 mm. thick, contg. 0.013–0.09% C were heated at the eutectoid temp., in a salt bath, for 10 hrs. and quickly cooled to room temp. The plates were then annealed for 8 hrs. at different temps. up to 710° and quenched in a 10% NaOH soln. at about 0°. About 0.3 mm. of the surface was removed electrolytically (cf. C.A. 45, 10160h) and the dried powders were used for Debye x-ray patterns. The range of soly. of C in α-Fe were thus estd. to be: at 700° not more than 0.054 and not less than 0.038%; not more than 0.038% at 650° and not less at 600°; not more ... at 550° and not less at 540°; not more than 0.015 at 500° and not less at 400°.

I. Bencowitz

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ARBUZOV, M. P.

which are distributed in [illegible] is presumably due to the fact that [illegible] the character of the distortion of [illegible]

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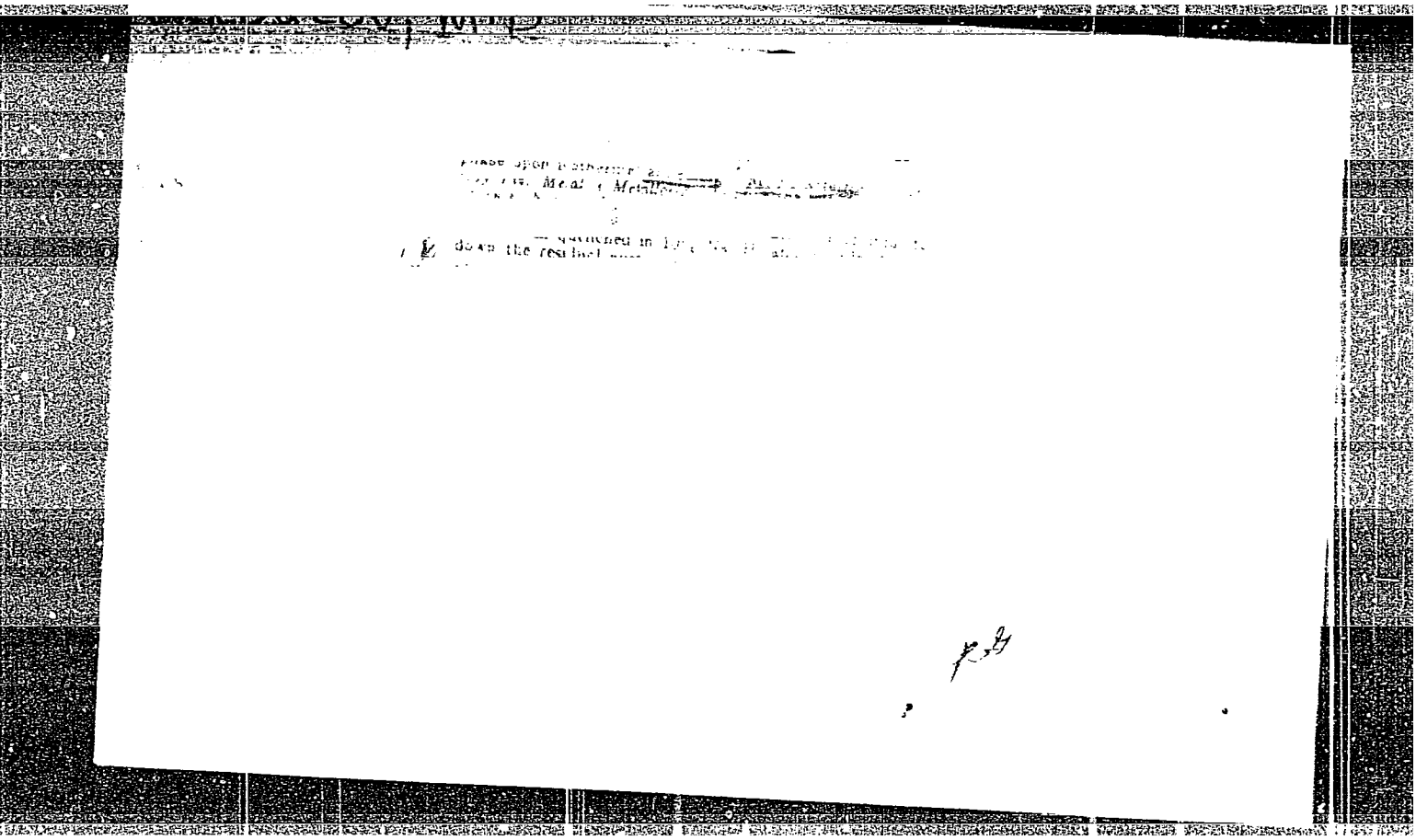

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SOV/126-6-6-15/25

AUTHORS: Arbuzov, M. P. and Krulikovskaya, M. P.

TITLE: Influence of Chromium on the Hardening and Softening of Nickel (Vliyaniye khroma na uprochneniye i razuprochneniye nikelya)

PERIODICAL: Fizika metallov i metallovedeniye, 1958, Vol 6, Nr 6, pp 1070-1076 (USSR)

ABSTRACT: In the work described in the paper, changes are studied in the fine crystalline structure (magnitude of Type II distortions, $\Delta a/a$, dimensions of the mosaic blocks, D) and in the hardness H_{R_A} of nickel-chromium alloys in the hardened state and in the process of softening during heating. Four Ni-Cr alloys with chromium concentrations of 3.87, 7.65, 14.43 and 18.90% were investigated. The work-hardened state was produced in the specimens by 80% reduction in a press. The softening was produced by heating in a salt bath to 400-850°C and maintaining at the appropriate temperatures for one hour. After heating, the specimens were cooled in air. X-ray diffraction patterns were ~~taken~~; details of their evaluation are described in the paper. In Fig.2, the curves are graphed of the changes, as a function of the heating temperature, in

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Influence of Chromium on the Hardening and Softening of Nickel

magnitude of the following: Type II distortions, $\Delta a/a$; dimensions of the block, D and the hardness H_{R_A} of the hardened alloys; these curves are based on the values entered in the table on p 1071. For an alloy containing 3.87% Cr in the hardened state, the Type II lattice distortions equal 1.85 x 10^{-3}; this value is conserved up to 400°C. If the temperature increases further, up to 500°C, there will be a slight decrease in $\Delta a/a$ but above 500°C the Type II lattice distortions will be quickly removed and at about 600°C they will become nearly zero. Up to 400°C, the block dimensions and the $\Delta a/a$ distortions do not change. Fig.3 shows the curves of the temperature dependence of $\Delta a/a$, of D and of the hardness for an alloy containing 7.65% Cr. Figs.4 and 5 contain similar curves for alloys containing 14.43% and 18.90% Cr, respectively. In Fig.6 the temperature dependence of the lattice distortions $\Delta a/a$ are compared for the investigated alloys and also for pure nickel. In Fig.7 the hardness values of the individual alloys are compared and it can be seen that the changes in these values are

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Influence of Chromium on the Hardening and Softening of Nickel

similar to those of $\Delta a/a$; however, the temperature of the beginning of an intensive drop in the hardness and the $\Delta a/a$ values are not the same. By comparing the dependence of the block dimensions on the heating temperature, it can be seen that the higher the alloying of the alloy, the higher will be the dispersion of the mosaic block for an equal degree of deformation and the higher will be the temperature at which intensive growth begins. The temperature at which intensive growth of the blocks begins coincides with the temperature of the beginning of an intensive drop in hardness. The relations differ somewhat from those stated above for an alloy containing 18.90% Cr. On the basis of the obtained results, the following conclusions are arrived at: the degree of hardening of an alloy during deformation depends on its Cr content, and, to some extent, on its initial structure. The higher the Cr content of the metal, the more intensive will be the hardening of the alloy under otherwise equal conditions. The hardened state of the investigated alloys is characterized

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by high lattice distortions ($\Delta a/a$) and small dimensions of the blocks; the smaller the dimensions of the blocks, the greater will be the hardness of the alloy. No similar relation was detected between the $\Delta a/a$ distortions and the hardness. Softening of the alloy during heating is accompanied by a decrease in the lattice distortions $\Delta a/a$ and a growth of the mosaic blocks. The temperature at which an intensive drop in the hardness begins to manifest itself coincides with the temperature of the beginning of intensive growth of the blocks. There are 8 figures, 1 table and 5 Soviet references.

ASSOCIATION: Institut metallofiziki, AN USSR (Institute of Physics of Metals, Academy of Sciences, Ukrainian SSR)

SUBMITTED: June 18, 1957.

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

18.8200
18.1250

67722
SOV/126-7-3-21/44

AUTHORS: Arbuzov, M. P. and Krulikovskaya, M. P.

TITLE: Kinetics of the Softening of Nickel-Chromium Alloys (Kinetika razuprochneniya splavov nikel'-khrom)

PERIODICAL: Fizika metallov i metallovedeniye, Vol 7, Nr 3, pp 432-437 (USSR) 1959

ABSTRACT: Arbuzov (Ref.1) carried out an investigation of the fine crystalline structure and mechanical properties (hardness) of nickel-chromium alloys which had been hardened by deformation, and those which had been softened by heating. The aim of the present work was to study the kinetics of distortion ($\Delta a/a$) removal, the growth of blocks D, and the change in hardness H_{R_A} of the hardened alloys at various heating temperatures. The study of the kinetics of distortion removal and block growth on isothermal heating was carried out in accordance with the width of the lines in X-ray photographs obtained for specimens of the alloys investigated. The hardness was tested on a Rockwell machine with a diamond cone at a load of 60 kg. Ni-Cr alloys (with chromium contents of 3.87, 7.65 and 14.43%) which had been hardened by compression in a press along one

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Kinetics of the Softening of Nickel-Chromium Alloys

axis were studied. Prior to deformation all specimens were heated at 1200°C for two hours. Softening of the first two alloys was carried out at temperatures of 550, 600, 650 and 700°C. The soaking times at these temperatures are indicated in Figs.1, 2 and 3. X-ray pictures of the alloys which had not been softened, as well as of those which had, were obtained from a copper irradiation of K_α in a camera with a drum diameter of 150 mm. The specimens were rotated during exposure. The calculation of the lattice distortion $\Delta a/a$ and of the block sizes was carried out according to the width of the lines (111) and (331). In Fig.1 kinetic curves for the lattice distortion $\Delta a/a$ of the 3.87% chromium alloy for softening temperatures of 550, 600 and 650°C are shown. In Figs.2 and 3 similar curves for 7.65% Cr and 14.43% Cr alloys, respectively, are shown. There exists an analogy between the kinetics of change in hardness with mosaic-block growth on isothermal heating of the hardened alloys. This can be seen from a comparison of the isothermal curves for the drop in hardness and block growth (see Figs.4 and 5). The results of the

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present investigation and the data of Arbuzov's work (Ref.1) clearly point to the fact that the hardening and softening processes in a solid solution are associated with changes in their fine crystalline structure. In Fig.6 the relationships between $\Delta a/a$ and chromium content in the nickel, which are preserved in the alloy after heating at 650°C for various soaking times, are shown. From the kinetic curves of Figs.1, 2 and 3 the activation energy E_a of lattice distortion removal can be calculated. The authors assumed that the heating time τ required for reducing the distortions $\Delta a/a$ to a certain value changes in relation to heating temperature according to the law

$$\tau = Ae^{-\frac{E_a}{kT}},$$

where k is the Boltzmann constant and T the absolute temperature. If τ_1, τ_2, τ_3... are the soaking times for temperatures T_1, T_2, T_3... then

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Kinetics of the Softening of Nickel-Chromium Alloys

$$E_a = R \frac{\ln \tau_n - \ln \tau_{n-1}}{\frac{1}{T_n} - \frac{1}{T_{n-1}}} \qquad (1)$$

From the above equation it follows that if $1/T_1$, $1/T_2$, $1/T_3$ are plotted along the abscissa axis and the logarithms of τ_1, τ_2, τ_3 along the ordinate, the points corresponding to these coordinates will lie on a straight line. The tangent of the angle of inclination of the straight line will be equal to the magnitude of the activation energy

$$E_a = R \tan \qquad (2)$$

In Fig.7 the dependence of $\ln \tau$ on $1/T$, found from the kinetic curves of Fig.1 for the 3.87% Cr alloy, is shown. For the construction of this relationship the heating times

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

SOV/139-58-6-15/29

AUTHORS: Arbuzov, M.P. and Chuistov, K.V.

TITLE: Change of Fine-Grained (Tonkoy) Crystal Structure in Softened Deformed Copper and in the Alloys Cu-Zn and Cu-Al (Izmeneniye tonkoy kristallicheskoy struktury pri razuprochnenii deformirovannoy medi i splavov Cu-Zn i Cu-Al)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, 1958, Nr 6, pp 91-98 (USSR)

ABSTRACT: The experimental material consisted of specimens 10 x 10 x 10 mm, which were hardened by uniaxial compression of 80%. Softening was accomplished by heating in a salt bath at temperatures of 100, 200, 300, 400 and 500°C. Samples were taken from the hardened and softened samples for X-ray examination and Rockwell hardness measurement. The size of the second-order distortions [this expression is not further defined in the paper] and the mean size of the mosaic blocks were derived from the X-ray diagrams and, together with Rockwell hardness, are plotted against temperature in Fig 1-3. It is concluded (1) that the introduction of Al and Zn into Cu leads to an increase both in the

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

Change of Fine-Grained (Tonkoy) Crystal Structure in Softened Deformed Copper and in the Alloys Cu-Zn and Cu-Al

softening temperature and in the hardening of the alloy with compression; (2) the character of the softening is identical in copper and in the alloys Cu-Al and Cu-Zn; (3) the size of the mosaic blocks plays a predominant part in the conservation of hardness on heating. There are 4 figures, 7 tables and 5 Soviet references.

ASSOCIATION: Kiyevskiy Institut Grazhdanskogo Vozdushnogo Flota (Kiyev Institute of the Civil Aviation)

SUBMITTED: 5th April 1958

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV, M.P.; BIL'DZYUKEVICH, I.A.; KRULIKOVSKAYA, M.P.

The hardening and softening of nickel-base alloys. Izv.vys. ucheb.zav.; fiz. no.3:78-83 '59. (MIRA 12:10)

1. Kiyevskiy institut grazhdanskogo vozdushnogo flota i Institut metallofiziki AN USSR.
(Nickel alloys)

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV, M.P.; CHUISTOV, K.V.

Changes in fine crystal structure during the softening of deformed copper and Cu-Zn and Cu-Al alloys. Izv.vys.ucheb.zav.; fiz. no.6: 91-98 '59. (MIRA 12:4)

1. Kiyevskiy institut grazhdanskogo vozdushnogo flota.
(Copper alloys--Metallography)

APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

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67723

18.1250

SOV/126-7-3-22/44

AUTHORS: Arbuzov, M. P. and Chernyy, V. G.

TITLE: Influence of Aluminium and Titanium on the Hardening and Softening of Nichrome-Type Alloys (Vliyaniye alyuminiya i titana na uprochneniye i razuprochneniye splavov tipa nikhrom)

PERIODICAL: Fizika metallov i metallovedeniye, Vol 7, Nr 3, pp 438-442 (USSR) 1959

ABSTRACT: The aim of this work was to study the influence of aluminium and titanium on the change of the fine crystal structure (secondary distortions and mosaic block dimensions) and the mechanical properties (hardness) in the course of hardening and softening of Ni-Cr alloys. Ni-Cr-Al, Ni-Cr-Ti, and Ni-Cr-Al-Ti alloys were chosen for investigation. The chemical composition of these alloys is given in Table 1. Alloys 4 and 5 are of the age-hardening type. Specimens were cut from rods, annealed at 1050 - 1080°C and furnace cooled. The slow cooling brought about equilibrium conditions in the age-hardening alloys. The homogenized specimens were deformed by 80% by compression along one axis. From the plates obtained

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

Influence of Aluminium and Titanium on the Hardening and Softening of Nichrome-Type Alloys

by deformation specimens were prepared for X-ray exposure and hardness testing. The alloys were softened at 400 - 800°C. The extent of secondary distortion $\Delta a/a$ and the block size D were determined from the width of the line (Refs.1, 3 and 4) and by a harmonic analysis of the X-ray pictures of the investigated alloys (Ref.5, 6). The values for $\Delta a/a$ and D obtained by a calculation according to the two methods are in good agreement. Hence their difference was not taken into consideration in the discussion of the results of this work. The hardness was tested on a Rockwell machine with a diamond cone at a load of 60 kg (scale A). X-ray pictures of specimens which had not been softened, and those which had, were obtained in a copper irradiation in cameras having a drum diameter of 150 mm. The specimens were rotated during exposure. In Figs.1, 2 and 3 curves for the change in secondary lattice distortion, block dimensions and hardness H_{R_A} of the hardened alloys in relation to heating temperature

Card 2/4 have been plotted from data given in Table 2. The greater

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Influence of Aluminium and Titanium on the Hardening and Softening of Nichrome-Type Alloys

the aluminium content in Ni-Cr alloys, the greater the lattice distortions and hardness. Conversely, a very large block size is observed in an alloy with a lower aluminium content. The same mechanism holds good for alloys with two supplementary alloying elements - aluminium and titanium, see Table 3. The authors arrived at the following conclusions: The fact that the secondary lattice distortions and block dimensions obtained from the width and from the harmonic analysis of the line are in good agreement with each other shows that if the function of the distribution intensity of the transverse line is correctly chosen, the line width method is as accurate as the harmonic analysis method. A comparison of the results obtained, with analogous data for nichrome (80% Ni, 20% Cr) leads to the conclusion that alloying nichrome with aluminium and titanium results in greater strengthening after deformation and displaces softening processes to the region of higher temperatures. The latter is evidently associated with the fact that aluminium and titanium increase the interatomic bond forces[18]

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Influence of Aluminium and Titanium on the Hardening and Softening of Nichrome-Type Alloys

in the lattice of a solid solution.
There are 3 figures, 3 tables and 8 Soviet references.

ASSOCIATION: Institut metallofiziki AN USSR (Institute of Metal Physics, Ac. Sc., Ukrainian SSR.

SUBMITTED: June 18, 1957

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APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

82332

18.7500

S/139/60/000/03/012/045
E073/E335

AUTHOR: Arbuzov, M.P.

TITLE: Influence of Alloying Elements on the Kinetics of Growth of Crystallites of the Carbide Phase During Isothermal Tempering

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, Nr 3, pp 76 - 82 (USSR)

ABSTRACT: Results of studying the kinetics of decomposition of martensite have shown that alloying elements did not impede greatly the speed of the first stage of martensite decomposition. The activation energy of the martensite decomposition of steel alloyed with various elements differs relatively little from that of carbon steel. As an illustration of this fact the author gives data on the half-life values of martensites of various steels at various temperatures, based on work published by Kurdyumov and Kozyrskiy (Ref 1) and also the results of measurement of the ratios of the axes (c/A) at various tempering temperatures for carbon and alloy steels (Refs 2,3). These results indicate that alloying elements do not show any substantial influence on the speed of the first stage of

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Influence of Alloying Elements on the Kinetics of Growth of Crystallites of the Carbide Phase During Isothermal Tempering

martensite decomposition. It can be assumed that the slowing down of the martensite decomposition in alloy steels is due to the impeding effect of the alloying elements on the coagulation of the carbide phase. To elucidate this problem and also the rôle of alloying elements in conserving high mechanical properties of steels at elevated temperatures, the author considered it necessary to investigate the state of the carbide phase which forms during decomposition of alloyed austenite. The author investigated the kinetics of growth of the crystallites (the mosaic blocks) of the carbide phase of chromium and molybdenum steels during isothermal tempering. The steels investigated contained 1.00% C and 1.45% Cr and, respectively, 1.20% C and 2.00% Cr. The kinetic curves of the growth of carbide crystallites in chromium, molybdenum and carbon steels are plotted in Figures 1, 2 and 3, respectively. The dimensions of the mosaic blocks and the time dependence of their growth on the various tempering temperatures

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E073/E335

Influence of Alloying Elements on the Kinetics of Growth of Crystallites of the Carbide Phase During Isothermal Tempering

have been determined on the basis of data of measurements of the width of X-ray diffraction lines of alloyed cementite. From the obtained kinetic curves, the activation energy of the coagulation of the carbide phase of the investigated steels was calculated and these values are compared with those pertaining to the carbide phase of carbon steel. It was found that the presence of the alloying elements, chromium and molybdenum, have a slowing-down effect on the coagulation of the carbide phase during tempering and this contributes to the conservation of the fine nonuniform structure of the steel up to very high temperatures and this is also the reason why the softening of steels occurs at higher temperatures.
There are 3 figures, 6 tables and 5 Soviet references.

ASSOCIATION: Institut metallofiziki (Institute of Physics of Metals)
Kiyevskiy institut GVF (Kiyev Institute GVF)

SUBMITTED: July 8, 1959

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APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

S/139/60/000/03/031/045
E073/E335

AUTHORS: Arbuzov, M.P., Krulikovskaya, M.P. and Chernyy, V.G.

TITLE: Study of the Process of Hardening of the Solid Solutions Nickel-chromium-aluminium and Nickel-chromium-tungsten

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, Nr 3, pp 170 - 174 (USSR)

ABSTRACT: In earlier work (Refs 1-3), the authors studied the processes of softening of nichrome and they elucidate the influence of some alloying elements on these processes. In this paper, the authors study the processes of hardening in alloys of a similar type. The experiments were carried out on two alloys, one containing 0.025% C, 19.55% Cr, 0.6% Al, rest Ni, the other containing 0.03% C, 21.04% Cr, 3.51% W, rest Ni. The concentration of the third element in at.% was practically equal for both alloys (1.25 at.% Al, 1.15 at.% W). The alloys were melted down and then forged into rods from which cylindrical specimens of 15 and 10 mm dia, 15 mm high, were produced. The specimens were homogenized at 1000 °C.

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S/139/60/000/03/031/045
E073/E335

Study of the Process of Hardening of the Solid Solutions Nickel-chromium-aluminium and Nickel-chromium-tungsten

The annealed specimens were subjected to plastic deformation by uniaxial compression to a degree of 5 to 80% by means of a 100-ton press. The authors studied the changes in the fine crystalline structure - Type II lattice distortions $\Delta a/A$ and the mosaic blocks D - and they also determined the real compression stresses σ and the hardness H_{R_A}. The results of X-ray analysis are given in Tables 2 and 3; the results of mechanical tests are given in Tables 4 and 5. In figure 1 the changes are plotted of the real compression stresses, the hardness, the magnitude of Type II distortions and of the mosaic blocks as a function of the degree of deformation. It was found that there is an analogy between the changes in σ, H_{R_A}, $\Delta a/a$ and D for both alloys. It was established that the main hardening

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

S/126/61/011/004/011/023
E021/E435

AUTHORS: Arbuzov, M.P. and Gitgarts, M.I.

TITLE: Study of the State of the Solid Solution of ЭИ437А (EI437A) alloy During Ageing

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.4, pp.568-574

TEXT: The kinetics of the decomposition of the solid solution were studied by X-ray analysis. The composition of the alloy EI437A was Cr 20.82, Ti 2.45, Al 0.91, Fe 0.57, Si 0.32, Mn 0.25, Cu 0.05, C 0.04, P 0.008, S 0.004, Pb 0.0003% and remainder Ni. Samples were heated at 1095°C for eight hours and air-cooled. They were then aged at 600, 700, 750, 800, 850 and 900°C for up to 150 hours. Copper radiation was used together with nickel and aluminium filters. The lattice parameter could be measured with an accuracy of ± 0.0001 Å. Fig.1 shows the change in lattice parameter with time at different temperatures. The most intensive decomposition occurred at 800 to 850°C and the biggest change occurred in the first 5 to 10 hours of ageing. At low temperatures the decomposition of solid solution is retarded because of the low diffusion mobility of the

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atoms. At higher temperatures the diffusion is much greater and decomposition takes place much more rapidly. At 900°C, however, the solubility of Al and Ti is considerably higher than at 850°C. Therefore, after a few hours ageing, the composition approaches equilibrium for that temperature. Fig.2 shows the change in the width of the (420) line with ageing time at various temperatures. Further X-ray photographs were taken with non-moving samples. Fig.3 shows some of these photographs after 150 hours ageing. The reflections from the quenched sample show that the specimen was very homogeneous. In the samples aged at 750, 800 and 850°C there was considerable dispersion of the reflections and an increase in their number. At 600 and 700°C changes were noted after long ageing times. At 900°C the dispersion of the reflections is seen but their number and dimensions differ little from that of the quenched sample. The increase in the width of the line at 800 to 850°C is caused in the main by marked concentration inhomogeneities which occur during the ageing process. At 750°C decomposition is accompanied by continuously growing concentration inhomogeneities. At the same time, the regions of coherent reflections are breaking up. At 900°C, concentration

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Study of the State of ...

inhomogeneities arise and the regions of coherent reflection are relatively large. At 700°C, there are slight concentration inhomogeneities. The finely dispersed character of this probably leads to the formation of a fine mosaic structure with small misorientated regions of coherent reflection. There are 3 figures and 6 references: 5 Soviet and 1 non-Soviet.

ASSOCIATION: Kiyevskiy institut GVF
(Kiyev Institute GVF)

SUBMITTED: May 14, 1960 (initially)
December 10, 1960 (after revision)

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APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

22956

18.9200

S/126/61/011/005/001/015
E193/E183

AUTHORS: Arbuzov, M.P., and Gitgarts, M.I.

TITLE: X-ray investigation of the phase precipitated during ageing of the ЭИ437А (EI437A) alloy

PERIODICAL: Fizika metallov i metallovedeniye, Vol.11, No.5, 1961, pp. 664-669

TEXT: The investigation described in the present paper was conducted in continuation of the earlier work (Ref.1: FMM, 1961, Vol.11, 568) concerned with the constitution and structure of aged alloy EI437A, consisting of (wt.%): 20.82 Cr, 2.45 Ti, 0.91 Al, 0.57 Fe, 0.32 Si, 0.25 Mn, 0.05 Cu, 0.04 C, 0.008 P, 0.004 S, 0.0003 Pb, remainder Ni. Cylindrical specimens 26 mm in diameter and 6 mm thick were solution-treated (eight hours at 1095 °C, followed by air-quenching) after which they were aged at 600, 700, 750, 800, 850 and 900 °C for periods ranging up to 150 hours. The kinetics of the growth of the α' precipitates was studied by studying the variation of the size of the regions of coherent scattering, this parameter being considered to be a sufficiently accurate criterion of the size of the α'-phase particles, owing to

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X-ray investigation of the phase....

the fact that these particles usually consist of single blocks. The X-ray diffraction analysis was carried out on cylindrical specimens 0.8 mm in diameter, prepared from α'-phase particles which had been extracted from the aged specimens by electrolytic dissolution in an electrolyte containing 10 g ammonium sulphate and 10 g of citric acid in 1200 cc of water. Some X-ray work was also carried out on massive, aged specimens. The dimension, D_x, of the mosaic blocks was determined from the width of the (111) and (420) lines, the (420) lines being used to determine the lattice parameter of the α' phase. Hardness of the aged specimens was also determined. The results are reproduced graphically in Figs. 1 and 2. In Fig.1, D_x (10^{-6} cm) is plotted against ageing time (hours) at temperatures indicated by each curve. (The size of the α'-phase particles in specimens aged at 600 °C was too small to be determined by the method employed). It will be seen that with increasing time and/or temperature of ageing, the size of the α' particles increases, the process being relatively slow at [illegible] and 750 °C, and very fast at 900 °C, so much so that the size of the α' particles after 25 hours' ageing at 900 °C is too large to be determined by X-ray diffraction. The lattice parameter of the

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E193/E183

X-ray investigation of the phase ...

α' phase at 800-900 °C was found to be practically constant, which indicated that the composition of this phase in this temperature range is also practically constant. The X-ray diffraction patterns obtained on specimens aged for 100 hours at 900 °C showed side by side with the lines of the disordered f.c.c. lattice of the α' phase, the presence of weak (100), (210), (211), (221) + (300), (310) and (321) lines, indicating the existence of a superstructure. The fact that long-range order can exist in the α' phase in a wide temperature range indicates its relatively high stability. The lattice parameter of the α' phase determined on massive specimens was on average 0.008 Å smaller than that determined on α' particles extracted by electrolytic dissolution. This indicated that the α' particles in an aged alloy are subjected to tri-axial compression in the elastic range. Fig.2 shows hardness H_V of the aged specimens plotted against the ageing time, at temperatures indicated by each curve. It will be seen that hardness of specimens aged at 600, 700 and 750 °C continuously increased with time, reaching after 150 hours the value of 223, 289 and 286 kg/mm^2, respectively. H_V of the solution-treated alloy being 155-160 kg/mm^2. The rate of hardening is at its maximum in the initial stages of the process,

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X-ray investigation of the phase....

and slows down after the first 5-10 hours. This character of the hardness curves can be explained on the basis of kinetics of the decomposition of solid solutions, illustrated in Fig.3 (Ref.1), where the lattice parameter, a (Å), of the solid solution is plotted against the ageing time (hours). It will be seen that the rate of decomposition in the initial stage of the process is fast as a result of which a large quantity of the α' phase is precipitated, although the particle size of the precipitate is relatively small; hence the rapid increase in hardness of the alloy during this stage. On further ageing, the rate of decomposition decreases and the size of the precipitated α'-phase particles increases at a rate which increases with the ageing temperature (see Fig.1), as a result of which the rate of hardening decreases. Low hardness of alloy aged at 600 °C is due to the small quantity of the α' phase present. The differences in hardness attained by ageing at various temperatures for various times can be explained by the difference in the quantity of the α' phase and/or in the size of the particles of the phase.

V.I. Arkharov is mentioned for his contribution in this field.

There are 3 figures, 1 table and 9 references: 8 Soviet and 1 non-Soviet.

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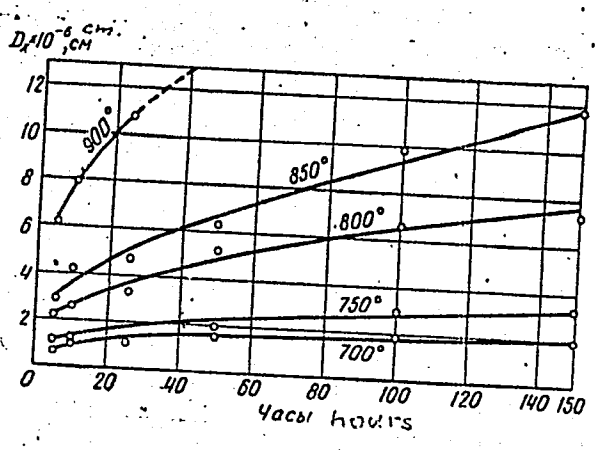
22956

X-ray investigation of the phase S/126/61/011/005/001/015
E193/E183

ASSOCIATION: Kiyevskiy institut GVF (Kiyev Institute GVF).
SUBMITTED: June 25 1960 (initially),
February 1 1961 (after revision)

Fig.1



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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

S/126/61/012/005/009/028
E193/E383

AUTHORS: Arbuzov, M.P. and Gitgarts, M.I.

TITLE: A study of thermal expansion of the solid solution [matrix] and the precipitated phase in the ЭИ437А (EI437A) alloy

PERIODICAL: Fizika metallov i metallovedeniye, v.12, no. 5, 1961, 693 - 696

TEXT: In the case of pure metals the thermal expansion coefficient, λ, decreases with increasing magnitude of interatomic forces and the object of the present investigation was to check whether the same applied to solid solutions and intermediate phases. To this end the temperature-dependence of λ of pure Ni and of both the solid-solution matrix and the precipitated α'-phase in solution-treated and aged alloy EI437A was determined. Instead of the usual dilatometric method X-ray diffraction was used to determine λ, which was calculated from data on the lattice parameter of the materials studied. Since the results of X-ray diffraction analysis of the α'-phase could have been affected by the fact that particles of this phase

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S/126/61/012/005/009/028
E193/E383

A study of thermal expansion ....

in the actual alloy were subjected to compression, the lattice parameter of this phase was determined on specimens obtained by electrolytic dissolution of the aged alloy EI437A. The X-ray diffraction measurements were taken at 20, 100, 200, 300, 400 and 500 °C. The results are reproduced in a graph, where the lattice-parameter increment Δa, Å is plotted against temperature (°C), Curves 1-3 relating, respectively, to pure Ni, solid-solution matrix in alloy EI437A and the α'-phase. The calculated values of λ are given in a table. The results indicated that the atomic bond forces were lower in pure Ni, greater in the solid-solution matrix and greater still in the precipitated α'-phase. These findings were in agreement with previously established data (Ref. 4: G.V. Kurdyumov and N.T. Travina - Problemy metallovedeniya i fiziki metallov, 1955, no. 4, 402) on the characteristic temperature of these materials which was 350 °C for Ni, 500 °C for the solid-solution matrix and 690 °C for the α'-phase. There are 1 figure, 1 table and 12 Soviet-bloc references.

ASSOCIATION: Kiyevskiy instute GVF (Kiyev Institute GVF)
SUBMITTED: May 3, 1961
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APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9"

"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

S/659/62/008/000/012/028
I048/I248

AUTHORS: Arbuzov, M.P., and Chuprina, V.G.

TITLE: An X-ray investigation of the crystalline structure of alloys in the system Ni_3Al-Ni_3Nb

SOURCE: Akademiya nauk SSSR. Institut metalurgii. Issledovaniya po zharoprochnym splavam. v.8. 1962. 85-87

TEXT: The structure of Ni_3Al, Ni_3Nb, and various Ni_3Al-Ni_3Nb alloys was studied by the powder method using the Fe radiation, in a Debye camera 57.3 mm. in diameter. The Ni_3Al composition has an f.c.c. lattice, with a lattice constant a=3.562 Å; superlattice lines indicate an ordered structure . The Ni_3Nb composition has a rhombic lattice, with lattice constants a = 5.090 Å, b = 4.234 Å, c = 4.524 Å; here, too, an ordered structure is indicated by superlattice lines. The experimental data for both compositions is in good agreement with data from the literature for the intermetallic compounds of identical composition. Alloys containing 10-40% Ni_3Nb are composed of one phase only, with a structure similar to that of

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3668

S/126/62/013/002/014/019
E039/E135

24.7100
18.9200

AUTHORS: Arbuzov, M.P., and Khayenko, B.V.

TITLE: A study of the orientation of the low temperature phase carbide Fe_xC

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.2, 1962, 294-299

TEXT: It is well known that when hardened carbon steel is annealed two carbides develop; the low temperature carbide Fe_xC and a carbide with a rhombic lattice, cementite. It has been shown that the low temperature carbide has a tightly packed hexagonal lattice. While the orientation of cementite has been sufficiently well studied experimentally and theoretically, the orientation of the low temperature carbide phase has not been determined experimentally. Previous work on the subject is of a qualitative nature. In this work the orientation of the low temperature carbide has been carried out by a method which involves the construction of polar diagrams from X-ray diffraction measurements. These measurements were made on hardened single

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S/126/62/013/003/012/023
E021/E180

AUTHORS: Arbuzov, M.P., and Gitgarts, M.I.

TITLE: The problem of quantitative separation of phases by the method of anodic dissolution

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.3, 1962, 411-414

TEXT: The commercial alloy ЭИ 437А (EI437A) of great high-temperature-strength was used in the investigation. Disc-shaped samples (26 mm diameter, 6 mm high) were prepared and cooled in air after holding at 1095 °C for 8 hours. Ageing at 600, 700, 750, 800 and 900 °C for up to 150 hours was carried out. The electrolyte used for the electrochemical separation of the α'-phase - $Ni_3(Al,Ti)$ - consisted of 10 g ammonium sulphate, 10 g citric acid and 1200 ml water. One of the end surfaces of the samples was cleaned of oxides by polishing and preliminary anodic dissolution to a depth of 0.8-1 mm. The samples were then freed from precipitate, washed in ethyl alcohol, dried in air and weighed. Anodic dissolution was carried out using a current

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density of 0.06 A/cm^2, at 0 °C for 1.5 hours. Afterwards the sample and the precipitate produced were removed, washed with ethyl alcohol, dried in air and weighed. The quantity of α'-phase was determined as a percentage of the total part of the sample dissolved. The quantity of α'-phase produced increased with increasing time. On increasing the temperature from 600 to 750 °C the quantity also increased, but on increasing the temperature further to 900 °C the quantity decreased. These results did not agree with the amount of precipitate calculated from measurements of the lattice parameter of the solid solution. The results, however, are explained as follows. At 600 °C the particles have very small dimensions and their free energy will be large. Thus, during anodic dissolution, they will dissolve to a marked degree. With increased ageing time the quantity of particles and their size increase. At 700-750 °C there is much fuller precipitation and the particle size reaches 100-300 Å. With increase in ageing temperature to 800 °C and higher, the particles are much larger, the rate of their dissolution increases but the separation is less complete.

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The problem of quantitative ... S/126/62/013/003/012/023
E021/E180

There are 4 figures.

ASSOCIATION: Kiyevskiy institut GVF
(Kiev Institute GVF)

SUBMITTED: May 26, 1961

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

S/126/62/013/005/007/031
E111/E435

AUTHORS: Arbuzov, M.P., Khayenko, B.V.

TITLE: X-ray diffraction study of the crystal structure of the carbide phase at different stages in the tempering of steel

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.5, 1962, 686-692 + 1 plate

TEXT: In spite of considerable efforts by various investigators using X-ray and electron diffraction and magnetic methods, the crystal structure of low-temperature carbon in tempered steel is not firmly established and the existence of an intermediate carbide with a Curie point of 260 to 270°C has not been structurally demonstrated. Therefore, further X-ray investigations of tempering were carried out in the range 100 to 680°C on carbon steels with 1.5 and 1.1% C, types У15 (U15) and У10 (U10) respectively. "Single crystals" of austenite were used, prepared by slow cooling of an ingot in the gamma-range, followed by quenching and cold treatment. Cylindrical specimens

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X-ray diffraction study ...

were made such that their axes coincided with the $[001]_\gamma$ direction. Monochromatic radiation was used for the X-ray work. With tempering temperatures below 200°C, a low-temperature carbide phase (the carbide Fe_xC or ε-carbide) is formed with a hexagonal close-packed lattice. Tempering at 200 to 400°C leads to the formation of two carbide phases: a low-temperature hexagonal close-packed carbide and a carbide with the rhombic lattice of cementite; with tempering over 400°C only cementite is present. No intermediate carbide (χ -carbide) was detected in the steel. The results agree with those obtained previously by one of the authors (M.P.Arbuzov. DAN SSSR, v.73, no.1, 1950) by electrolytic separation of the carbide phase from tempered steel; it is evident that a phase with the rhombic cementite lattice was then isolated and that all the conclusions then drawn about changes in the state of cementite during steel tempering remain valid. There are 1 figure and 2 tables.

ASSOCIATION: Kiyevskiy institut GVF (Kiyev Institute GVF)

SUBMITTED: June 17, 1961

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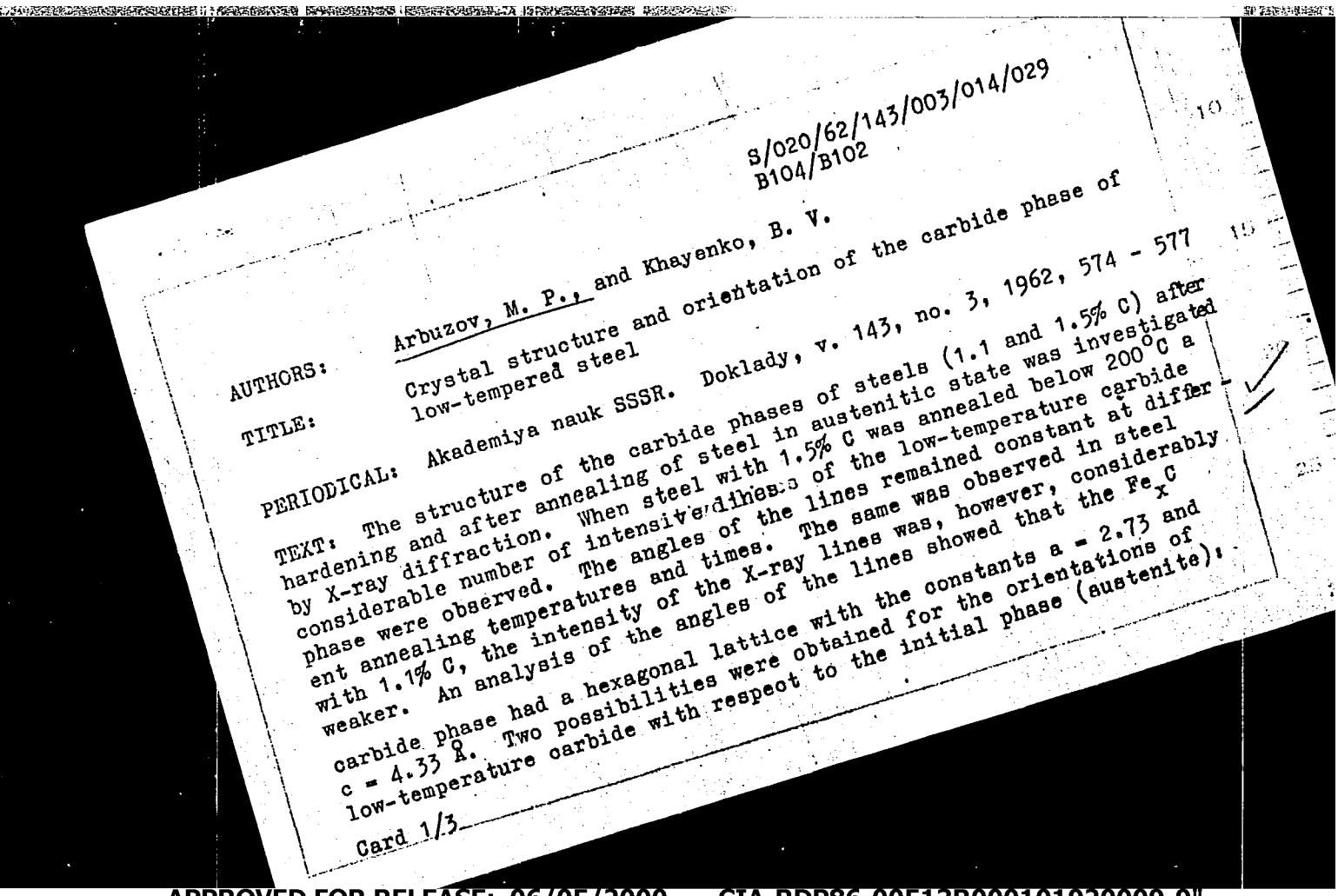

S/020/62/143/003/014/029
B104/B102

AUTHORS: Arbuzov, M. P., and Khayenko, B. V.

TITLE: Crystal structure and orientation of the carbide phase of low-tempered steel

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 3, 1962, 574 - 577

TEXT: The structure of the carbide phases of steels (1.1 and 1.5% C) after hardening and after annealing of steel in austenitic state was investigated by X-ray diffraction. When steel with 1.5% C was annealed below 200°C a considerable number of intensive lines of the low-temperature carbide phase were observed. The angles of the lines remained constant at different annealing temperatures and times. The same was observed in steel with 1.1% C, the intensity of the X-ray lines was, however, considerably weaker. An analysis of the angles of the lines showed that the Fe_xC carbide phase had a hexagonal lattice with the constants a = 2.73 and c = 4.33 Å. Two possibilities were obtained for the orientations of low-temperature carbide with respect to the initial phase (austenite);

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Crystal structure and ...

I. $\begin{cases}(001)_{Fe_xC} \parallel (111)_\gamma \\ [100]_{Fe_xC} \parallel [10\bar{1}]_\gamma\end{cases}$ II. $\begin{cases}(001)_{Fe_xC} \parallel (865)_\gamma \\ [100]_{Fe_xC} \parallel [\bar{1}\bar{3}\bar{8}]_\gamma\end{cases}$ ( ).

A comparison with the results obtained by G. V. Kurdyumov (Vestn. metallo-prom., no. 9, 20(1932)) gives

III. $\begin{cases}(011)_M \parallel (111)_\gamma \\ [1\bar{1}1]_M \parallel [10\bar{1}]_\gamma\end{cases}$ ( ) for the orientation of martensite relative to austenite. Relative to austenite Fe_xC is oriented in two ways only: Ia which has been mentioned and

II a. $\begin{cases}(001)_{Fe_xC} \parallel (101)_M \\ [100]_{Fe_xC} \parallel [11\bar{1}]_M\end{cases}$ ( ).

On annealing in the range 200 - 400°C two carbide phases were observed: low-temperature carbide and cementite. Above 400°C only cementite is observed. There are 2 figures and 11 references: 9 Soviet and 2 non-Soviet. The reference to the English-language publication reads as follows: K. H. Jack, Iron and Steel Inst., 169, 26 (1951).

ASSOCIATION: Kiyevskiy institut Grazhdanskogo vozdushnogo flota (Kiyev Institute of the Civil Air Fleet)

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

ARBUZOV, M.P.; CHUPRINA, V.G.

Study of aging alloys of the system Ni_3Al - Ni_3Nb. Izv. vys. uchob. zav.; fiz. no.5:82-85 '63. (MIRA 16:12)

1. Kiyevskiy institut Grazhdanskogo vozdushnogo flota.

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L 12623-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/HW-2/JT

ACCESSION NR: AP3001698 S/0126/63/015/005/0725/0728

AUTHOR: Arbuzov, M. P.; Zelenkov, I. A.

TITLE: Structure of Ni sub 3 Al alloys with additions of a third component

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 5, 1963, 725-728

TOPIC TAGS: Ni sub 3 Al, inclusion, Cr, Ti, Mo, W, lattice constant, monophase alloy, biphase alloy, hardness

ABSTRACT: Following the procedure described by Guard, R. W. and Westbrook, J. H. (Trans. Metallurg. Soc. AIME, 1959, 215, 807), alloys of Ni sub 3 Al with Cr, Ti, Mo and W inclusions were produced in electric furnaces and tempered at 1000C for 50 hours. The third component was added at the expense of either Ni or Al in ten experiments. Cylindrical samples of alloys, 6 mm high and 18 mm thick, were examined by the X-ray method, by a microstructural study, and by measurements of their hardness. It was concluded that Cr, Ti, Mo and W usually replace atoms of Al in the crystal lattice of Ni sub 3 Al. Lattice constants and phases of each alloy were determined. The addition of a third component at the expense of Al produces the monophase alloy (Gamma sup prime phase) with a crystal lattice of Ni sub 3 Al but with a different lattice constant. The replacement of Ni by one of the

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L 12623-63

ACCESSION NR: AP3001698

2

added components produces a biphase alloy (Gamma sup prime phase and Beta phase) whose lattice constant is bigger than that of a pure Ni sub 3 Al. The hardness of biphase alloys increases with higher Beta phase content and is much higher than that of monophase alloys. Orig. art. has: 1 table.

ASSOCIATION: Kiyevskiy institut GVF (Kiev GVF Institute)

SUBMITTED: 10Jul62 DATE ACQ: 11Jul63 ENCL: 01

SUB CODE: 00 NO REF SOV: 003 OTHER: 003

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"APPROVED FOR RELEASE: 06/05/2000 CIA-RDP86-00513R000101920009-9

L 18237-63 EWP(q)/EWT(m)/BDS AFFTC/ASD Pad JD/HW/JG

ACCESSION NR: AP3006375 S/0126/63/016/002/0236/0240

AUTHOR: Arbuzov, M. P.; Zelenkov, I. A.

TITLE: Study of the thermal expansion of Ni_3Al with additions of a third element

SOURCE: Fizika metallov i metallovedeniye, v. 16, no. 2, 1963, 236-240

TOPIC TAGS: Ni_3Al compound, Ni_3Al-Ta alloy, Ni_3Al-Zr alloy, Ni_3Al-V alloy, Ni_3Al-Mn alloy, Ni_3Al-Ti alloy, Ni_3Al-Cr alloy, $(Ni_3-Cr)_3Al$ alloy, $Ni_3(Al-Cr)$ alloy, thermal-expansion coefficient, temperature dependence, β-phase, γ'-phase, K-state

ABSTRACT: The effect of alloying with Cr, Mn, Mo, Ta, Ti, V, W, and Zr on the coefficient of thermal expansion α of Ni_3Al compound has been studied in the 100—950C range. Alloying elements were introduced as a substitute for part of the Ni or Al. Alloys were homogenized in vacuum at 1000C for 50 hr. Test specimens were furnace-cooled or water-quenched after annealing at 1000C for 2 hr and then heated in a dilatometer at a mean rate of 2.5 C/min. Test results showed that all alloying elements except Cr decreased α at all test temperatures and that the effect of an element varied with the test temperature.

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L 18237-63
ACCESSION NR: AP3006375

At temperatures up to 300C, the effectiveness of the alloying elements in reducing α decreased as the value of α of the alloying elements increased, i.e., Ta, Zr, V, Mn, Ti. The nature of the change depended also on which component was replaced by the alloying element. For example, a partial substitution of Cr for Al decreased the α of the alloy, while substitution of Cr for Ni increased α, promoting formation of a second, NiAl-base β-phase. A partial substitution of W or Mo for Al in Ni Al also decreased the α of the compound. In single-phase alloys and, probably, in alloys with a low content of the second phase, the coefficient α increased linearly as the temperature increased to 600—700C except in the 480—550C range, where it decreased by about $0.4—1.0 \times 10^{-6}$ per degree. Above 600—700C, the temperature dependence of α becomes nonlinear in all alloys except those with Ta or Zr addition. In the single-phase alloys the magnitude of α and its temperature dependence remained practically the same for specimens water-quenched or furnace-cooled from 1000C. Two-phase alloys behaved differently. The typical temperature dependence of the α of a two-phase alloy is shown in Fig. 1 of the Enclosure. An increase in the α of more rapidly cooled specimens in the 850—950C range can be explained by the disordering of the β-phase, while a sharp drop in the α of quenched specimens at 400C and a subsequent increase at 550—575C are probably

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